Identifying the Adult Immunosuppressed Subgroups Most Vulnerable to Severe COVID-19 infection.

Appendices submitted for the degree of

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By

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Appendix 1: Rapid Scoping Review of Green Book-defined Immunosuppressed Categories' Seasonal Influenza Mortality Outcomes

Green Book Category	Reference	Year	Country	Effect Size	CI	Mortality Rate/Proportion	Notes
Chemotherapy	Li et al	2020	China	1.3	(1.13-1.49)	5.4% mortality in hospitalised cancer patients with concomitant influenza	No standalone paper on chemotherapy patients' seasonal influenza mortality found; effect size compares cancer patients hospitalised with and without influenza
Radical radiotherapy	Li et al	2020	China	1.3	(1.13-1.49)	5.4% mortality in hospitalised cancer patients with concomitant influenza	No standalone paper on radiotherapy patients' seasonal influenza mortality found; effect size compares cancer patients hospitalised with and without influenza
Solid Organ Transplantation	Yalcin et al	2020	Turkey			5.2% mortality	Results over the course of two influenza seasons
Bone Marrow / Stem Cell Transplantation	Nichols et al	2004	US			10% mortality	
HIV	Cohen et al	2012	South Africa	South African, 2.2; US, 1.3	South African (1.0-5.1), US (0.3-5.3)	5-17% South African; 3-5% US	Excess death rate used for effect measure; all-cause winter deaths attributable to influenza data is age banded
Multiple Myeloma	Teh et al	2015	Australia			33.3% inpatient mortality	n=12, important context for mortality
Primary Immunodeficiencies	Kunisaki et al	2009	Global				No standalone paper on PID patients' seasonal influenza mortality found - descriptive paper provided
Biologics	Kunisaki et al	2009	Global				No standalone paper on Biologic patients' seasonal influenza mortality - descriptive paper provided
Steroid sparing agents	Kunisaki et al	2009	Global				No standalone paper on steroid sparing agents patients' seasonal influenza mortality - descriptive paper provided
Systemic steroids	Rodrigo et al	2014	Global	2.12	(1.36-3.29)		Meta analysis
Haematological malignancies	Modemann et al	2021	Germany			12% 90-day mortality	Work compares influenza infection outcomes in HM patients to those of COVID-19
Long Term Immunosuppressives	Kunisaki et al	2009	Global				No standalone paper on long-term immunosuppressive recipients' seasonal influenza mortality - descriptive paper provided

Appendix 2: Conversion of Green Book Chapter 14a into Immunosuppression Terms

Green Book Chapter 14a Immunosuppression

Immunosuppression	Immunosuppression due to disease or treatment, including patients undergoing chemotherapy leading to immunosuppression, patients undergoing radical radiotherapy, solid organ transplant recipients, bone marrow or stem cell transplant recipients, HIV infection at all stages, multiple myeloma or genetic disorders affecting the immune system (e.g. IRAK-4, NEMO, complement disorder, SCID). Individuals who are receiving immunosuppressive or immunomodulating biological therapy including, but not limited to, anti-TNF, alemtuzumab, ofatumumab, rituximab, patients receiving protein kinase inhibitors or PARP inhibitors, and individuals treated with steroid sparing agents such as cyclophosphamide and mycophenolate mofetil. Individuals treated with or likely to be treated with systemic steroids for more than a month at a dose equivalent to prednisolone at 20mg or more per day for adults. Anyone with a history of haematological malignancy, including leukaemia, lymphoma, and myeloma. Those who require long term immunosuppressive treatment for conditions including, but not limited to, systemic lupus erythematosus, rheumatoid arthritis, inflammatory bowel disease, scleroderma and psoriasis. Some immunosuppressed patients may have a suboptimal immunological response to the vaccine (see Immunosuppression and HIV).

Conversion to Key Subgroups

A. Transplantations:
'*Immunosuppression due to disease or treatment, including … solid organ transplant recipients, bone marrow or stem cell transplant recipients*'

B. Malignancies:
'Immunosuppression due to disease or treatment, including patients undergoing chemotherapy leading to immunosuppression, patients undergoing radical radiotherapy…multiple myeloma….Anyone with a history of haematological malignancy, including leukaemia, lymphoma and myeloma'

C. Immunosuppressive Agents:
'Immunosuppression due to disease or treatment, including … Individuals who are receiving immunosuppressive or immunomodulating biological therapy including, but not limited to, anti-TNF, alemtuzumab, ofatumumab, rituximab, patients receiving protein kinase inhibitors or PARP inhibitors, and individuals treated with steroid sparing agents such as cyclophosphamide and mycophenolate mofetil. Individuals treated with or likely to be treated with systemic steroids for more than a month at a dose equivalent to prednisolone at 20mg or more per day for adults and… Those who require long term immunosuppressive treatment'

D. Rheumatological Conditions:
'Immunosuppression due to disease or treatment, including… Those who require long term immunosuppressive treatment for conditions including, but not limited to, systemic lupus erythematosus, rheumatoid arthritis, inflammatory bowel disease, scleroderma and psoriasis.'

E. Primary and Acquired Immunosuppression
'*Immunosuppression due to disease or treatment, including … HIV infection at all stages… or genetic disorders affecting the immune system (e.g. IRAK-4, NEMO, complement disorder, SCID)'*

Final Categories

Transplantation

Malignancy

Immunosuppressive Agents

Rheumatological Conditions

HIV

Appendix 3: Search terminology

A. Search terms applied within OVID database, combining Green Book immunosuppression terms with established syntax for COVID-19 and mortality

1. *(immunodef* or immunosup* or immunocomprom* or autoimm* or chemo* or radiother* or "biological therap*" or immunomod* or steroid or prednisolone or HIV or transplant* or myeloma or PID or "primary immunodeficiency disorder" or "human immunodeficiency virus" or AIDS or "acquired immunodeficiency syndrome" or "haematological malignancy" or leukaemia or lymphoma or "rheumatoid arthritis" or IBS or "inflammatory bowel disease" or scleroderma or psoriasis or lupus).ti*
2. *(COVID-19 or "Sars-CoV-2" or COVID*).ti*
3. *(death or "excess death" or mortality or "excess mortality"). ti*

1 AND 2 AND 3

B. Search terms applied within PubMed database, combining Green Book immunosuppression terms with established syntax for COVID-19 and mortality

chemo[Title] OR radiother*[Title] OR "solid organ transplant*"[Title] OR "bone marrow transplant*"[Title] OR "stem cell transplant*"[Title] OR myeloma[Title] OR complement[Title] "biological therap*"[Title] OR immunothera* [Title] OR immunomod*[Title] OR "primary immunodeficiency disorder"[Title] OR PID[Title] OR HIV[Title] OR "human immunodeficiency virus"[Title] OR AIDS[Title] OR "Acquired immunodeficiency syndrome"[Title] OR steroid*[Title] OR prednisolone[Title] OR "haematological malignancy"[Title] OR leukaemia[Title] OR lymphoma[Title] OR "rheumatoid arthritis"[Title] OR IBS[Title] OR "inflammatory bowel disease"[Title] OR scleroderma[Title] OR psoriasis[Title] OR SLE[Title] OR lupus[Title]*

AND

COVID[Title] OR "COVID-19"[Title] OR "Sars-CoV-2"[Title]*

AND

death[Title/Abstract] OR mortality[Title/Abstract] OR "excess death"[Title/Abstract] OR "excess mortality"[Title/Abstract]

C. Search terms applied within Google Scholar database, combining Green Book immunosuppression terms with established syntax for COVID-19 and mortality

COVID-19 immunocompromised "excess mortality" AND chemotherapy OR radiotherapy OR solid OR organ OR transplant OR myeloma OR complement OR biologics OR immunotherapy OR PID OR HIV OR AIDS OR steroid OR prednisolone OR malignancy OR lymphoma OR arthritis OR IBS OR scleroderma OR lupus OR psoriasis

Appendix 4: Abridged Study Screening Form, Phase 1 and 2 Compatible

Title	Year	Journal	Issue #	Pages	Authors	URL	Abstract	DOI	Keywords	Chapter 14a Subgroup	Case study	n<50	Immunotherapy as candidate COVID treatment	Single centre	Compounded risk/immunosuppression/ outcome	Paediatric	No exposed and unexposed mortality data provided	Population statistic	All-cause mortality	2023 data	Meta-analysis	Decision and justification	Notes
Tumor necrosis factor inhibitors are associated with a decreased risk of COVID-19-associated hospitalization in patients with psoriasis-A population-based cohort study	2021	Dermatol Ther	4	e15003	Kridin et al																		
Characteristics, outcomes, and mortality amongst 133,589 patients with prevalent autoimmune diseases diagnosed with, and 48,418 hospitalised for COVID-19: a multinational distributed network cohort analysis	2020	MedRxiv : the Preprint Server for Health Sciences		27	Tan et al																		
Prevalence and Mortality due to COVID-19 in HIV Co-Infected Population: A Systematic Review and Meta-Analysis	2021	Infect Dis Ther	3	1267-1285	Liang et al																		
COVID-19 mortality in patients with cancer on chemotherapy or other anticancer treatments: A prospective cohort study	2020	The Lancet		1919-1926	Lee et al																		

Appendix 5: Completed Newcastle Ottawa Bias Assessment Form

Author	Title	Representativeness of exposed cohort	Source of non-exposed cohort	Ascertainment of exposure	Demonstration that outcome was not present at start of study	Comparability of cohorts	Assessment of outcome	Sufficient follow-up time	Completeness of follow-up	AHRQ standard fairness assessment
Alpert et al	Clinical course of cancer patients with COVID-19: a retrospective cohort study	1	1	1	1	2	1	1	1	Good quality
Attauabi et al	Outcomes and long-term effects of COVID-19 in patients with inflammatory bowel diseases—A Danish prospective population-based cohort study with individual-level data	1	1	1	1	2	1	1	1	Good quality
Belleudi et al	Direct and indirect impact of COVID-19 for patients with immune-mediated inflammatory diseases: a retrospective cohort study	1	/	1	1	2	1	1	1	Good quality
Bennett et al	Multicenter Study of Outcomes Among Persons With HIV Who Presented to US Emergency Departments With Suspected SARS-CoV-2	1	1	1	1	2	1	1	1	Good quality
Bertoglio et al	Poor Prognosis of COVID-19 Acute Respiratory Distress Syndrome in Lupus Erythematosus: Nationwide Cross-Sectional Population Study Of 252 119 Patients	1	1	1	1	2	1	1	1	Good quality
Bhaskaran et al	HIV infection and COVID-19 death: a population-based cohort analysis of UK primary care data and linked national death registrations within the OpenSAFELY platform	1	1	1	1	2	1	1	1	Good quality
Boulle	Risk factors for COVID-19 death in a population cohort study from the Western Cape Province, South Africa	1	1	1	1	2	1	1	1	Good quality
Brar et al	COVID-19 severity and outcomes in patients with cancer: A matched cohort study	1	1	1	1	2	1	1	1	Good quality
Bruera et al	Patients with systemic lupus erythematosus have an increased risk of mortality, mechanical ventilation, and hospitalization from COVID-19	1	1	1	1	2	1	1	1	Good quality
Cabello et al	COVID-19 in people living with HIV: A multicenter case-series study	1	/	1	1	/	1	1	1	Poor quality
Caillard et al	Is COVID-19 infection more severe in kidney transplant recipients?	1	/	1	1	1	1	1	1	Good quality
Chavarro et al	COVID-19 severity in kidney transplant recipients is similar to nontransplant patients with similar comorbidities	1	/	1	1	2	1	1	1	Good quality
Chavez-MacGregor et al	Evaluation of COVID-19 mortality and adverse outcomes in US patients with or without cancer	1	1	1	1	2	1	1	1	Good quality
Chiriboga et al	Risk of COVID-19 Infection and Hospitalization in Patients With Inflammatory Rheumatic Disease Compared With the General Population	1	1	1	1	2	1	1	1	Good quality
Costa et al	Higher severity and risk of in-hospital mortality for COVID-19 patients with cancer during the year 2020 in Brazil: A countrywide analysis of secondary data	1	1	1	1	1	1	1	1	Good quality
Curtis et al	Characteristics, comorbidities, and outcomes of SARS-cov-2 infection in patients with autoimmune conditions treated with systemic therapies: a population-based study.	1	1	1	1	2	1	1	1	Good quality
D'Silva et al	COVID-19 outcomes in patients with systemic autoimmune rheumatic diseases compared to the general population: a US multicenter, comparative cohort study	1	1	1	1	2	1	1	1	Good quality
Dai et al	Patients with Cancer Appear More Vulnerable to SARS-CoV-2: A Multicenter Study during the COVID-19 Outbreak	1	1	1	1	2	1	1	1	Good quality

de Azambuja et al	Impact of solid cancer on in-hospital mortality overall and among different subgroups of patients with COVID-19: a nationwide, population-based analysis	1	1	1	1	2	1	1	1	Good quality
Dursten feld et al	Impact of HIV Infection on COVID-19 Outcomes Among Hospitalized Adults in the U.S	1	1	1	1	2	1	1	1	Good quality
Fernan dez-Cruz et al	Higher mortality of hospitalized haematologic patients with COVID-19 compared to non-haematologic is driven by thrombotic complications and development	1	1	1	1	1	1	1	1	Good quality
Ferri et al	Prevalence and death rate of covid-19 in autoimmune systemic diseases in the first three pandemic waves. relationship with disease subgroups	1	/	1	1	2	1	1	1	Good quality
Figuero a-Parra et al	Risk of severe COVID-19 outcomes associated with rheumatoid arthritis and phenotypic subgroups: a retrospective, comparative, multicentre cohort study	1	1	1	1	1	1	1	1	Good quality
Fisher et al	Outcomes of COVID-19 in hospitalized solid organ transplant recipients compared to a matched cohort of non-transplant patients at a national healthcare system in the United States	1	1	1	1	2	1	1	1	Good quality
Flanner y et al	A comparison of COVID-19 inpatients by HIV status	1	1	1	1	/	1	1	1	Poor quality
Fu et al	COVID-19 outcomes in hospitalized patients with active cancer: Experiences from a major New York City health care system	1	1	1	1	1	1	1	1	Good quality
Garnea u et al	Clinical outcomes of patients previously treated with B-cell depletion therapy hospitalized with COVID-19: results from the Johns Hopkins Crown Registry	1	1	1	1	2	1	1	1	Good quality
Geretti et al	Outcomes of COVID-19 related hospitalization among people with HIV in the ISARIC WHO Clinical Characterization Protocol (UK): a prospective observational study	1	1	1	1	2	1	1	1	Good quality
Gisondi et al	Incidence rates of hospitalization and death from COVID-19 in patients with psoriasis receiving biological treatment: A Northern Italy experience	1	/	1	1	/	1	1	1	Poor quality
Hachem et al	Comparing the outcome of COVID-19 in cancer and non-cancer patients: An international multicenter study.	1	1	1	1	//	1	1	1	Poor quality
Hadi et al	Incidence, outcomes, and impact of COVID-19 on inflammatory bowel disease: propensity matched research network analysis	1	1	1	1	/	1	1	1	Poor quality
Hadi et al	Characteristics and outcomes of COVID-19 in patients with HIV: a multicentre research network study	1	1	1	1	2	1	1	1	Good quality
Hadi et al	Outcomes of COVID-19 in solid organ transplant recipients: a propensity-matched analysis of a large research network	1	1	1	1	2	1	1	1	Good quality
Hedberg et al	Incidence and severity of COVID-19 in adults with and without HIV diagnosis.	1	1	1	1	2	1	1	1	Good quality
Johann esen et al	COVID-19 in cancer patients, risk factors for disease and adverse outcome, a population-based study from Norway	1	1	1	1	1	1	1	1	Good quality
Kjeldse n et al	Outcome of COVID-19 in hospitalized patients with chronic inflammatory diseases. A population based national register study in Denmark	1	1	1	1	2	1	1	1	Good quality
Kodvanj et al	Inflammatory Bowel Disease Is Associated with an Increased Risk for Covid-19-Related Hospitalization, but Not with Mortality: Croatian Nationwide Cohort Study	1	1	1	1	/	1	1	1	Poor quality
Kridin et al	Nineteen months into the pandemic, what have we learned about COVID-19-related outcomes in patients with psoriasis?	1	1	1	1	1	1	1	1	Good quality
Kwapon g et al	Effect of HIV status on ICU admission and mortality among hospitalized coronavirus disease 2019 (COVID-19) patients	1	1	1	1	2	1	1	1	Good quality

Lee et al	Comparative outcomes in hospital admissions with COVID-19 in people living with HIV and people living without HIV: a retrospective study	1	1	1	1	2	1	1	1	Good quality
Looha et al	The impact of HIV on the risk of COVID-19 death among hospitalized patients	1	1	1	1	2	1	1	1	Good quality
Lunski et al	Multivariate mortality analyses in COVID-19: comparing patients with cancer and patients without cancer in Louisiana	1	1	1	1	2	1	1	1	Good quality
MacKenna et al	Risk of severe COVID-19 outcomes associated with immune-mediated inflammatory diseases and immune-modifying therapies: a nationwide cohort stud	1	1	1	1	2	1	1	1	Good quality
Mahdavi et al	Factors associated with COVID-19 and its outcome in patients with rheumatoid arthritis	1	/	1	1	/	1	1	1	Poor quality
Mangone et al	Cumulative COVID-19 incidence, mortality and prognosis in cancer survivors: a population-based study in Reggio Emilia, Northern Italy	1	1	1	1	/	1	1	1	Poor quality
Mansoor et al	Clinical Characteristics, Hospitalization and Mortality Rates of COVID-19 Among Liver Transplant Patients in the United States: A Multi-Center Research Network Study	1	1	1	1	2	1	1	1	Good quality
Marozoff et al	Severe COVID-19 outcomes among patients with autoimmune rheumatic diseases or transplantation: a population-based matched cohort study	1	1	1	1	1	1	1	1	Good quality
Martinez-Lopez et al	Multiple myeloma and SARS-CoV-2 infection: clinical characteristics and prognostic factors of inpatient mortality	1	1	1	1	2	1	1	1	Good quality
Miyashita et al	Prognosis of coronavirus disease 2019 (COVID-19) in patients with HIV infection in New York City	1	1	1	1	/	1	1	1	Poor quality
Miyashita et al	Do patients with cancer have a poorer prognosis of COVID-19? An experience in New York City.	1	1	1	1	/	1	1	1	Poor quality
Molnar et al	Outcomes of critically ill solid organ transplant patients with COVID-19 in the United States	1	1	1	1	2	1	1	1	Good quality
Moreno-Torres et al	Predictors of in-hospital mortality in HIV-infected patients with COVID-19	1	1	1	1	2	1	1	1	Good quality
Moreno-Torres et al	Systemic Autoimmune Diseases in Patients Hospitalized with COVID-19 in Spain: A Nation-Wide Registry Study	1	1	1	1	2	1	1	1	Good quality
Myint et al	Routine use of immunosuppressants is associated with mortality in hospitalised patients with COVID-19	1	1	1	1	2	1	1	1	Good quality
Nair et al	An early experience on the effect of solid organ transplant status on hospitalized COVID-19 patients	1	1	1	1	2	1	1	1	Good quality
Olalla-Sierra et al	Coronavirus disease 2019 hospitalization outcomes in persons with and without HIV in Spain	1	1	1	1	2	1	1	1	Good quality
Osmanodja et al	Undoubtedly, kidney transplant recipients have a higher mortality due to COVID-19 disease compared to the general population	1	1	1	1	//	1	1	1	Poor quality
Ozturk et al	Mortality analysis of COVID-19 infection in chronic kidney disease, haemodialysis and renal transplant patients compared with patients without kidney disease: a nationwide analysis from Turkey	1	1	1	1	2	1	1	1	Good quality
Pablos et al	Clinical outcomes of hospitalised patients with COVID-19 and chronic inflammatory and autoimmune rheumatic diseases: a multicentric matched cohort study	1	1	1	1	2	1	1	1	Good quality
Pakhchanian et al	COVID-19 outcomes in patients with dermatomyositis: a registry-based cohort analysis	1	1	1	1	2	1	1	1	Good quality
Park	COVID-19 in the largest US HIV cohort. AIDS	1	1	1	1	2	1	1	1	Good quality

Parker et al	Clinical features and outcomes of COVID-19 admissions in a population with a high prevalence of HIV and tuberculosis: a multicentre cohort study	1	1	1	1	2	1	1	1	Good quality
Passamonti et al	Clinical characteristics and risk factors associated with COVID-19 severity in patients with haematological malignancies in Italy: a retrospective, multicentre, cohort study.	1	/	1	1	2	1	1	1	Good quality
Patel	Clinical outcomes and inflammatory markers by HIV serostatus and viral suppression in a large cohort of patients hospi- talized with COVID-19	1	1	1	1	2	1	1	1	Good quality
Peron	Covid-19 presentation and outcomes among cancer patients: A matched case-control study	1	1	1	1	2	1	1	1	Good quality
Qi et al	Clinical outcomes of COVID-19 patients with rheumatic diseases: a retrospective cohort study and synthesis analysis in Wuhan, China	1	1	1	1	2	1	1	1	Good quality
Raad et al	International Multicenter Study Comparing Cancer to Non-Cancer Patients with COVID-19: Impact of Risk Factors and Treatment Modalities on Survivorship	1	1	1	1	2	1	1	1	Good quality
Raez et al	Mortality and prognostic factors in hospitalized COVID-19 patients with cancer: an analysis from a large healthcare system in the United States	1	1	1	1	2	1	1	1	Good quality
Raiker et al	254 COVID-19 related outcomes in psoriasis and psoriasis arthritis patients.	1	1	1	1	2	1	1	1	Good quality
Raiker et al	Outcomes of COVID-19 in patients with rheumatoid arthritis: A multicenter research network study in the United States	1	1	1	1	2	1	1	1	Good quality
Ranabothu et al	Outcomes of COVID-19 in solid organ transplants	1	1	1	1	/	1	1	1	Poor quality
Rasmussen et al	Outcomes following SARS-CoV-2 infection among individuals living with and without HIV; a Danish nationwide cohort study	1	/	1	1	1	1	1	1	Good quality
Rorat et al	The course of COVID-19 in patients with systemic autoimmune rheumatic diseases	1	1	1	1	2	1	1	1	Good quality
Rosenthal et al	Factors associated with SARS-CoV-2-related hospital outcomes among and between persons living with and without diagnosed HIV infection in New York State	1	1	1	1	2	1	1	1	Good quality
Rugge et al	SARS-CoV-2 infection in the Italian Veneto region: adverse outcomes in patients with cancer.	1	1	1	1	1	1	1	1	Good quality
Rutter et al	COVID-19 infection, admission and death among people with rare autoimmune rheumatic disease in England: results from the RECORDER project	1	/	1	1	1	1	1	1	Good quality
Sahota et al	Incidence, Risk Factors, and Outcomes of COVID-19 Infection in a Large Cohort of Solid Organ Transplant Recipients	1	1	1	1	2	1	1	1	Good quality
Seyyedsalehi et al	Hospital and post-discharge mortality in COVID-19 patients with a preexisting cancer diagnosis in Iran	1	1	1	1	2	1	1	1	Good quality
Shi et al	Association of Cancer with Risk and Mortality of COVID-19: Results from the UK Biobank	1	1	1	1	1	1	1	1	Good quality
Shin et al	Autoimmune inflammatory rheumatic diseases and COVID-19 outcomes in South Korea: a nationwide cohort study.	1	1	1	1	2	1	1	1	Good quality
Sigel et al	Covid-19 and people with HIV infection: outcomes for hospitalized patients in New York City	1	1	1	1	2	1	1	1	Good quality
Spence et al	COVID-19 Outcomes in a US Cohort of Persons Living with HIV (PLWH)	1	1	1	1	2	1	1	1	Good quality
Suarez-Garcia et al	In-hospital mortality among immunosuppressed patients with COVID-19: Analysis from a national cohort in Spain	1	1	1	1	2	1	1	1	Good quality
Sun et al	COVID-19 HOSPITALIZATION AMONG PEOPLE WITH HIV OR SOLID ORGAN TRANSPLANT IN THE US.	1	1	1	1	2	1	1	1	Good quality

Sun et al	COVID-19 Disease Severity among People with HIV Infection or Solid Organ Transplant in the United States: A Nationally-representative, Multicenter, Observational Cohort Study	1	1	1	1	2	1	1	1	Good quality
Swan et al	Hospitalization and survival of solid organ transplant recipients with coronavirus disease 2019: A propensity matched cohort study	1	1	1	1	2	1	1	1	Good quality
Tang et al	People with HIV have a higher risk of COVID-19 diagnosis but similar outcomes to the general population	1	1	1	1	2	1	1	1	Good quality
Tesoriero et al	COVID-19 Outcomes Among Persons Living With or Without Diagnosed HIV Infection in New York State	1	1	1	1	2	1	1	1	Good quality
Thompson et al	Investigation Into the Effect of COVID-19 Infection on Length of Hospital Stay and Mortality in Patients With Rheumatoid Arthritis	1	1	1	1	2	1	1	1	Good quality
Topless et al	Gout, Rheumatoid Arthritis, and the Risk of Death Related to Coronavirus Disease 2019: An Analysis of the UK Biobank	1	1	1	1	2	1	1	1	Good quality
Udovica et al	High mortality in patients with active malignancy and severe COVID-19: Results from an Austrian multicenter registry during the first period of the COVID-19 …	1	1	1	1	2	1	1	1	Good quality
Ungaro et al	Autoimmune and chronic inflammatory disease patients with COVID-19.	1	1	1	1	2	1	1	1	Good quality
Webb et al	Liver transplantation does not significantly increase risk of mortality from SARS-CoV-2 infection: International registry data	1	/	1	1	/	1	1	1	Poor quality
Westblade et al	SARS-CoV-2 viral load predicts mortality in patients with and without cancer who are hospitalized with COVID-19	1	1	1	1	1	1	1	1	Good quality
Yang et al	Associations between HIV infection and clinical spectrum of COVID-19: a population level analysis based on US National COVID Cohort Collaborative (N3C) data	1	1	1	1	2	1	1	1	Good quality
Yendewa et al	Clinical Features and Outcomes of Coronavirus Disease 2019 Among People With Human Immunodeficiency Virus in the United States: A Multicenter Study From a Large Global Health Research Network (TriNetX)	1	1	1	1	2	1	1	1	Good quality
Yigenoglu et al	The outcome of COVID-19 in patients with hematological malignancy.	1	1	1	1	2	1	1	1	Good quality
Yousaf et al	Clinical outcomes of COVID-19 in patients taking tumor necrosis factor inhibitors or methotrexate: a multicenter research network study.	1	1	1	1	2	1	1	1	Good quality
Zanetti et al	Increased COVID-19 mortality in patients with rheumatic diseases: results from the CONTROL-19 study by the Italian Society for Rheumatology	1	1	1	1	1	1	1	1	Good quality

Appendix 6: Data Extraction Forms by Immunosuppressed Category

i. Transplantation data extraction form

Authors	Title	Year	Income	IS Type	Exposed age	Unexposed age	Case	Time to mortality	Exposed (n)	Unexposed (n)	Exposed death	Exposed survivors	Unexposed death	Unexposed survivors	Effect Measure	Value	LB	UB	*p-value*	Matched	Adjusted criteria met
Caillard et al	Is COVID-19 infection more severe in kidney transplant recipients?	2021	H	Kidney	62	63	In-hospital	30 day	273	273	55	218	37	236	HR	1.55	1.02	2.35	0.039	Yes	Y
Chavarot et al	COVID-19 severity in kidney transplant recipients is similar to nontransplant patients with similar comorbidities	2022	H	Kidney	67.2	65.1	In-hospital	30 day	83	83	31	52	24	59	sHR	1.375	0.67	2.83	0.4	Yes	Y
Fisher et al	Outcomes of COVID-19 in hospitalized solid organ transplant recipients compared to a matched cohort of non-transplant pa-tients at a national healthcare system in the United States	2021	H	Mixed Cohort	60	60	In-hospital		128	3907					OR	1.93	1.18	3.15	<0.01	Yes	Y
Hadi et al	Outcomes of COVID-19 in solid organ transplant recipients: a propensity-matched analysis of a large research network	2022a	H	Mixed Cohort	54.5	55.2	In-hospital	60 day	2289	2289	138	2151	132	2157	RR	0.99	0.73	1.34		Yes	Y
Hadi et al	Outcomes of COVID-19 in solid organ transplant recipients: a propensity-matched analysis of a large research network	2022b	H	Kidney	52	30	In-hospital	30 day	1511	2289	57	1454	110	2179						Yes	Y
Hadi et al	Outcomes of COVID-19 in solid organ transplant recipients: a propensity-matched analysis of a large research network	2022c	H	Other			In-hospital	30 day	183	2289	13	170	110	2179						Yes	Y

Mansoor et al	Clinical Characteristics, Hospitalization and Mortality Rates of COVID-19 Among Liver Transplant Patients in the United States: A Multi-Center Research Network Study	2020	H	Liver	57.03	59.83	All Cases		125	125	10	115	10	115	RR	1	0.43	2.32	1	Yes	Y
Marozoff et al	Severe COVID-19 outcomes among patients with autoimmune rheumatic diseases or transplantation: a population-based matched cohort study	2022	H	Mixed Cohort	54.3	54	All Cases		222	1106	27	195	24	1082	OR	5.48	2.82	10.63		Yes	Y
Molnar et al	Outcomes of critically ill solid organ transplant patients with COVID-19 in the United States	2020	H	Mixed Cohort	58	61	In-hospital	28 day	98	288	39	59	124	164	RR	0.92	0.7	1.22	0.58	Yes	Y
Nair et al	An early experience on the effect of solid organ transplant status on hospitalized COVID-19 patients	2021	H	Mixed Cohort	61.8	62.7	In-hospital		82	1625	26	56	391	1234	OR	1.34	1.03	1.74	0.027	Yes	Y
Osmanodja et al	Undoubtedly, kidney transplant recipients have a higher mortality due to COVID-19 disease compared to the general population	2021	H	Kidney			All Cases		114	209960	10	113	6002	203958						No	N
Ozturk et al	Mortality analysis of COVID-19 infection in chronic kidney disease, haemodialysis and renal transplant patients compared with patients without kidney disease: a nationwide analysis from Turkey	2020	L	Kidney	48	51	In-hospital	28 day	81	450					HR	1.897	0.761	4.727	0.138	Yes	Y
Ranabothu et al	Outcomes of COVID-19 in solid organ transplants	2020a	H	Mixed Cohort	55.4	47.6	All Cases	30 day	288	30285	32	256	1155	29130	OR	3.15	2.17	4.57	<0.001	No	Y
Ranabothu et al	Outcomes of COVID-19 in solid organ transplants	2020b	H	Kidney	55.4	47.6	All Cases	30 day	224	30285	21	203	1155	29130						No	N
Sahota et al	Incidence, Risk Factors, and Outcomes of COVID-19 Infection	2022a	H	Mixed Cohort	55.7	57.3	All Cases		600	312011	88	512	5615	306396						No	N

	in a Large Cohort of Solid Organ Transplant Recipients																				
Sahota et al	Incidence, Risk Factors, and Outcomes of COVID-19 Infection in a Large Cohort of Solid Organ Transplant Recipients	2022b	H	Kidney			All Cases		438	312011	65	373	5615	306396						No	N
Sahota et al	Incidence, Risk Factors, and Outcomes of COVID-19 Infection in a Large Cohort of Solid Organ Transplant Recipients	2022c	H	Liver	62	57.3	All Cases		114	312011	10	104	5615	306396						No	N
Suarez-Garcia et al	In-hospital mortality among immunosuppressed patients with COVID-19: Analysis from a national cohort in Spain	2021	H	Mixed Cohort	63.5	66.5	In-hospital		166	11095	57	109	2143	8952	OR	3.12	2.23	4.36	<0.001	No	Y
Sun et al	COVID-19 Disease Severity among People with HIV Infection or Solid Organ Transplant in the United States: A Nationally-representative, Multicenter, Observational Cohort Study	2021	H	Mixed Cohort	57	47	All Cases	45 day	11392	1426984	875	10517	23831	1403153	OR	3.38	3.35	3.41	<0.01	No	Y
Swan et al	Hospitalization and survival of solid organ transplant recipients with coronavirus disease 2019: A propensity matched cohort study	2022	H	Mixed Cohort	57	58	In-hospital	60 day	100	500	16	84	70	430	OR	1.15	0.64	2.08	0.64	Yes	Y
Webb et al	Liver transplantation does not significantly increase risk of mortality from SARS-CoV-2 infection: International registry data	2020	H	Liver	60	73	All Cases		151	627	28	123	167	460						No	N

ii. Malignancy data extraction form

Authors	Title	Year	Income	IS Type	Exposed age	Unexposed age	Case	Time to mortality	Exposed (n)	Unexposed (n)	Exposed death	Exposed survivors	Unexposed death	Unexposed survivors	Effect Measure	Value	LB	UB	*p-value*	Matched	Adjusted criteria met
Alpert et al	Clinical course of cancer patients with COVID-19: a retrospective cohort study	2021	H	Mixed cohort			In-hospital		420	840					OR	1.12	0.86	1.45	1	Yes	Y
Brar et al	COVID-19 severity and outcomes in patients with cancer: A matched cohort study	2020	H	Mixed cohort	72.5	71.2	In-hospital		117	468	29	88	100	368	HR	0.98	0.58	1.67		Yes	Y
Costa et al	Higher severity and risk of in-hospital mortality for COVID-19 patients with cancer during the year 2020 in Brazil: A countrywide analysis of secondary data	2021b	L	Haematology			In-hospital		944	315410					OR	2.85	2.41	3.38	<0.001	No	N
Costa et al	Higher severity and risk of in-hospital mortality for COVID-19 patients with cancer during the year 2020 in Brazil: A countrywide analysis of secondary data	2021a	L	Mixed cohort	67	62	In-hospital		7406	315410	4479	2927	115066	200344	OR	1.94	1.83	2.06	<0.001	No	N
Costa et al	Higher severity and risk of in-hospital mortality for COVID-19 patients with cancer during the year 2020 in Brazil: A countrywide analysis of secondary data	2021c	L	Solid			In-hospital		6461	315410					OR	1.83	1.72	1.95	<0.001	No	N
Dai et al	Patients with Cancer Appear More Vulnerable to SARS-CoV-2: A Multicenter Study during the COVID-19 Outbreak	2020	H	Mixed cohort	64	63.5	In-hospital		105	536	12	93			OR	2.171	0.806	5.149	0.064	Yes	Y

de Azambuja	Impact of solid cancer on in-hospital mortality overall and among different subgroups of patients with COVID-19: a nationwide, population-based analysis	2020	H	Solid	75	70	In-hospital	30 day	892	9594	283	609	1922	7672	OR	1.34	1.13	1.58	<0.001	No	Y
Fernández-Cruz et al	Higher mortality of hospitalized haematologic patients with COVID-19 compared to non-haematologic is driven by thrombotic complications and development	2022	H	Haematology	70.7	69.6	In-hospital		71	142	27	44	26	116						Yes	N
Fu et al	COVID-19 outcomes in hospitalized patients with active cancer: Experiences from a major New York City health care system	2021b	H	Haematology			All Cases		69	3953	33	36	683	3270						No	N
Fu et al	COVID-19 outcomes in hospitalized patients with active cancer: Experiences from a major New York City health care system	2021a	H	Mixed cohort	71.2	62.2	All Cases		233	3953	80	153	683	2777	OR	1.89	1.33	2.67		No	N
Fu et al	COVID-19 outcomes in hospitalized patients with active cancer: Experiences from a major New York City health care system	2021c	H	Solid			All Cases		164	3953	48	121	158	7705						No	N
Hachem et al	Comparing the outcome of COVID-19 in cancer and non-cancer patients: An international multicenter study.	2020	H	Mixed cohort			All Cases	30 day	186	385	37	149	42	343						No	N

Johannesen et al	COVID-19 in cancer patients, risk factors for disease and adverse outcome, a population-based study from Norway	2021b	H	Haematology			All Cases		54	7863	3	51	158	7705	OR	1	0.28	3.65		No	Y
Johannesen et al	COVID-19 in cancer patients, risk factors for disease and adverse outcome, a population-based study from Norway	2021a	H	Mixed cohort			All Cases		547	7863	56	491	158	7705	OR	0.99	0.68	1.42		No	Y
Johannesen et al	COVID-19 in cancer patients, risk factors for disease and adverse outcome, a population-based study from Norway	2021c	H	Solid			All Cases		493	7863	53	440	158	7705	OR	0.99	0.68	1.44		No	Y
Lunski et al	Multivariate mortality analyses in COVID-19: comparing patients with cancer and patients without cancer in Louisiana	2020a	H	Mixed cohort			All Cases		312	4833	66	246	418	4415	OR	2.03	1.44	2.87		No	Y
Lunski et al	Multivariate mortality analyses in COVID-19: comparing patients with cancer and patients without cancer in Louisiana	2020b	H	Mixed cohort			In-hospital		157	1460	56	101	372	1088	OR	1.36	0.89	2.08		No	Y
Mangone et al	Cumulative COVID-19 incidence, mortality and prognosis in cancer survivors: a population-based study in Reggio Emilia, Northern Italy	2021	H	Mixed cohort			All Cases		447	4094	113	334	428	3666	OR	1.54	1.18	2		No	N
Martinez-Lopez et al	Multiple myeloma and SARS-CoV-2 infection: clinical characteristics and prognostic factors of inpatient mortality	2020	H	Haematology	71	71	In-hospital		167	167	56	111	38	129						Yes	N

Miyashita et al	Do patients with cancer have a poorer prognosis of COVID-19? An experience in New York City.	2020	H	Mixed cohort			In-hospital		334	5354	37	297	518	4836	RR	1.15	0.84	1.57		No	N
Passamonti et al	Clinical characteristics and risk factors associated with COVID-19 severity in patients with haematological malignancies in Italy: a retrospective, multicentre, cohort study.	2020	H	Haematology	68		In-hospital		536	29282	198	338			SMR	2.04	1.77	2.34		No	N
Péron et al	Covid-19 presentation and outcomes among cancer patients: A matched case-control study	2021	H	Mixed cohort	76	77	In-hospital	60 day	108	193	43	65	54	139	OR	2.00	1.20	3.40	0.0084	Yes	Y
Raad et al	International Multicenter Study Comparing Cancer to Non-Cancer Patients with COVID-19: Impact of Risk Factors and Treatment Modalities on Survivorship	2022	H	Mixed cohort	61	50	All Cases	30 day	1115	2851	122	993	226	2625	OR	1.46	1.03	2.07	0.035	No	N
Raez et al	Mortality and prognostic factors in hospitalized COVID-19 patients with cancer: an analysis from a large healthcare system in the United States	2022	H	Mixed cohort	71	60	In-hospital		265	4605	63	202	525	4080	OR	1.48	1.08	2.01	0.014	No	Y
Rugge et al	SARS-CoV-2 infection in the Italian Veneto region: adverse outcomes in patients with cancer.	2020a	H	Mixed cohort			All Cases		723	8552	106	617	385	8167						No	N

Rugge et al	SARS-CoV-2 infection in the Italian Veneto region: adverse outcomes in patients with cancer.	2020b	H	Haematology			All Cases		81	8552	13	68	385	8167	OR	2.39	1.24	4.58		No	N
Seyyedsalehi et al	Hospital and post-discharge mortality in COVID-19 patients with a preexisting cancer diagnosis in Iran	2022a	L	Mixed cohort	58.16	57.87	In-hospital	60 day	1090	5517	497	593	847	4670	OR	4.40	3.80	5.20		No	Y
Seyyedsalehi et al	Hospital and post-discharge mortality in COVID-19 patients with a preexisting cancer diagnosis in Iran	2022b	L	Haematology	51.6	57.87	In-hospital	60 day	423	5517	172	251	847	4670	OR	5.07	3.95	6.51		No	Y
Seyyedsalehi et al	Hospital and post-discharge mortality in COVID-19 patients with a preexisting cancer diagnosis in Iran	2022c	L	Solid	62.3	57.87	In-hospital	60 day	667	5517	233	434	847	4670	OR	4.13	3.41	5.01		No	Y
Shi	Association of Cancer with Risk and Mortality of COVID-19: Results from the UK Biobank	2020	H	Mixed cohort	61.36	56.11	All Cases		256	1306	46	210	160	1146	OR	1.04	0.71	1.51	0.83	No	N
Suarez-Garcia et al	In-hospital mortality among immunosuppressed patients with COVID-19: Analysis from a national cohort in Spain	2021a	H	Haematology	71	66.5	In-hospital		358	11095	139	219	2143	8952	OR	2.31	1.76	3.03	<0.001	Yes	Y
Suarez-Garcia et al	In-hospital mortality among immunosuppressed patients with COVID-19: Analysis from a national cohort in Spain	2021b	H	Solid	73.2	66.5	In-hospital		1081	11095	343	738	2143	8952	OR	1.39	1.18	1.63	<0.001	Yes	Y

Sun et al	Rates of COVID-19-related Outcomes in Cancer compared to non-Cancer Patients	2020	H	Mixed cohort	62	50	All Cases	30 day	67	256	9	58	4	252	OR	5.67	1.49	21.59		No	Y
Udovica et al	High mortality in patients with active malignancy and severe COVID-19: Results from an Austrian multicenter registry during the first period of the COVID-19 …	2022	H	Mixed cohort	74	76	In-hospital		89	5386	41	48	43	113	OR	4.59	2.26	9.3	<0.001	No	Y
Westblade et al	SARS-CoV-2 viral load predicts mortality in patients with and without cancer who are hospitalized with COVID-19	2020a	H	Mixed cohort	72	65	In-hospital		100	2914	30	70	725	2189						No	N
Westblade et al	SARS-CoV-2 viral load predicts mortality in patients with and without cancer who are hospitalized with COVID-19	2020b	H	Solid			In-hospital		60	2914	18	42	725	2189	OR					No	N
Yigenoglu et al	The outcome of COVID-19 in patients with hematological malignancy.	2021	L	Haematology	56	56	All Cases		740	740	102	638	50	690						Yes	Y

iii. Immunosuppressive Agents data extraction form

Authors	Title	Year	Income	IS Type	Exposed age	Unexposed age	Case	Time to mortality	Exposed (n)	Unexposed (n)	Exposed death	Exposed survivors	Unexposed death	Unexposed survivors	Effect Measure	Value	LB	UB	*p-value*	Matched	Adjusted criteria met
Belleudi et al	Direct and indirect impact of COVID-19 for patients with immune-mediated inflammatory diseases: a retrospective cohort study	2021	H	Biologics	56	51	All Cases		9176	4702567					OR	2	1.11	3.63		No	Y
Chavez-MacGregor	Evaluation of COVID-19 mortality and adverse outcomes in US patients with or without cancer	2021	H	Cancer treatment	66	48	All Cases	30 day	4296	493020	335	3961	24651	468369	OR	1.74	1.54	1.96	<0.001	No	Y
Garneau et al	Clinical outcomes of patients previously treated with B-cell depletion therapy hospitalized with COVID-19: results from the Johns Hopkins Crown Registry	2022	H	Unspecified	57.4	57.4	In-hospital	30 day	50	212	3	47	9	203						Yes	Y
Myint et al	Routine use of immunosuppressants is associated with mortality in hospitalised patients with COVID-19	2021	H	Unspecified	74		In-hospital		118	1066					HR	1.87	1.3	2.69	0.001	No	Y
Suarez-Garcia et al	In-hospital mortality among immunosuppressed patients with COVID-19: Analysis from a national cohort in Spain	2021a	H	Unspecified	71	66.5	In-hospital		2111	11095	661	1450	2143	8952	OR	1.6	1.43	1.79	<0.001	No	Y
Suarez-Garcia et al	In-hospital mortality among immunosuppressed patients with COVID-19: Analysis from a national cohort in Spain	2021b	H	Systemic steroid			In-hospital		570	11095	202	368	2143	8952	OR	2.16	1.8	2.61		No	Y
Suarez-Garcia et al	In-hospital mortality among immunosuppressed patients with COVID-19: Analysis from a national cohort in Spain	2021c	H	Biologics			In-hospital		183	11095	49	134	2143	8952	OR	1.97	1.33	2.91		No	Y
Suarez-Garcia et al	In-hospital mortality among immunosuppressed patients with COVID-19: Analysis from a	2021d	H	Unspecified			In-hospital		394	11095	109	285	2143	8952	OR	2.06	1.64	2.6		No	Y

	national cohort in Spain																				
Yousaf et al	Clinical outcomes of COVID-19 in patients taking tumor necrosis factor inhibitors or methotrexate: a multicenter research network study.	2021	H	Unspecified	55.1	54.9	All Cases		213	213	13	200	15	198	RR	0.87	0.42	1.78	0.6958	Yes	Y

iv. Rheumatological conditions data extraction form

Authors	Title	Year	Income	IS Type	Exposed age	Unexposed age	Case	Time to mortality	Exposed (n)	Unexposed (n)	Exposed death	Exposed survivors	Unexposed death	Unexposed survivors	Effect Measure	Value	LB	UB	*p-value*	Matched	Adjusted criteria met
Attauabi et al	Outcomes and long-term effects of COVID-19 in patients with inflammatory bowel diseases—A Danish prospective population-based cohort study with individual-level data	2022a	H	Gut	48		All Cases		319	230087	13	306	2404	227683	RR	3.9	2.89	6.65		No	Y
Attauabi et al	Outcomes and long-term effects of COVID-19 in patients with inflammatory bowel diseases—A Danish prospective population-based cohort study with individual-level data	2022b	H	Gut	44		All Cases		197	230087	2	195	2404	227683	RR	0.97	0.24	3.86		No	Y
Belleudi et al	Direct and indirect impact of COVID-19 for patients with immune-mediated inflammatory diseases: a retrospective cohort study	2022a	H	General	59	51	All Cases		65230	4702567					OR	1.22	0.95	1.56		No	Y

Belleudi et al	Direct and indirect impact of COVID-19 for patients with immune-mediated inflammatory diseases: a retrospective cohort study	2022c	H	Gut	53	51	All Cases		22525	4702567					OR	0.95	0.56	1.59		No	Y
Belleudi et al	Direct and indirect impact of COVID-19 for patients with immune-mediated inflammatory diseases: a retrospective cohort study	2022b	H	Joint	64	51	All Cases		20299	4702567					OR	1.25	0.84	1.85		No	Y
Belleudi et al	Direct and indirect impact of COVID-19 for patients with immune-mediated inflammatory diseases: a retrospective cohort study	2022d	H	Skin	60	51	All Cases		22406	4702567					OR	1.4	0.94	2.1		No	Y
Bertoglio et al	Poor Prognosis of COVID-19 Acute Respiratory Distress Syndrome in Lupus Erythematosus: Nationwide Cross-Sectional Population Study Of 252 119 Patients	2022	L	General	45.5	58.7	In-hospital		319	251800	126	193	82895	168905	RR	1.738	1.557	1.914		No	Y
Bruera et al	Patients with systemic lupus erythematosus have an increased risk of mortality, mechanical ventilation, and hospitalization from COVID-19	2022	H	General			All Cases	30 day	687	6870	25	662	124	6746	OR	1.39	0.79	2.44		Yes	Y
Chiriboga et al	Risk of COVID-19 Infection and Hospitalization in Patients	2022	H	General	61.8	40.2	In-hospital		470	26434	63	407	899	25535	RR	0.25	0.06	1		No	N

	With Inflammatory Rheumatic Disease Compared With the General Population																			
Curtis et al	Characteristics, comorbidities, and outcomes of SARS-cov-2 infection in patients with autoimmune conditions treated with systemic therapies: a population-based study.	2022c	H	Gut	52	49	All Cases		811	311563	17	794	5226	306337	OR	1.11	0.68	1.82		No	Y
Curtis et al	Characteristics, comorbidities, and outcomes of SARS-cov-2 infection in patients with autoimmune conditions treated with systemic therapies: a population-based study.	2022a	H	Joint	61	49	All Cases		2306	311563	93	2213	5226	306337	OR	1.35	1.09	1.68		No	Y
Curtis et al	Characteristics, comorbidities, and outcomes of SARS-cov-2 infection in patients with autoimmune conditions treated with systemic therapies: a population-based study.	2022b	H	Skin	55	49	All Cases		421	311563	8	413	5226	306337	OR	1.24	0.53	1.94		No	Y
D'Silva et al	COVID-19 outcomes in patients with systemic autoimmune rheumatic diseases compared to the general population: a US multicenter, comparative cohort study	2022	H	General	58	58	All Cases	30 day	2379	2379	93	2286	79	2300	RR	1.18	0.88	1.58		Yes	Y

Ferri	Prevalance and Death Rate of COVID-19 in Autoimmune Systemic Diseases in the First Three Pandemic Waves. Relationship with Disease Subgroups and Ongoing Therapies	2022	H	General	59		All Cases		316	4051401	12	304	12376	4039025	OR	1.25	0.7	2.22	0.45	No	N
Figueroa-Parra et al	Risk of severe COVID-19 outcomes associated with rheumatoid arthritis and phenotypic subgroups: a retrospective, comparative, multicentre cohort study	2022	H	Joint	62	61	All Cases		582	2875	26	556	59	2816	HR	1.53	0.94	2.48		No	N
Gisondi et al	Incidence rates of hospitalization and death from COVID-19 in patients with psoriasis receiving biological treatment: A Northern Italy experience	2022	H	Skin	53.4	52.3	All Cases		6481	144909					SIR	0.42	0.07	1.38	0.19	No	N
Hadi et al	Incidence, outcomes, and impact of COVID-19 on inflammatory bowel disease: propensity matched research network analysis	2022a	H	Gut	49.72	49.79	All Cases	30 day	4310	4310	90	4220	95	4215	RR	0.947	0.712	1.26		Yes	Y
Hadi et al	Incidence, outcomes, and impact of COVID-19 on inflammatory bowel disease: propensity matched research	2022b	H	Gut			All Cases	30 day	2082	4310	41	2041	95	4215	RR	0.759	0.508	1.134		Yes	Y

	network analysis																			
Hadi et al	Incidence, outcomes, and impact of COVID-19 on inflammatory bowel disease: propensity matched research network analysis	2022c	H	Gut			All Cases	30 day	2190	4310	46	2144	95	4215	RR	1.314	0.85	2.032		Yes	Y
Kjeldsen et al	Outcome of COVID-19 in hospitalized patients with chronic inflammatory diseases. A population based national register study in Denmark	2022	H	General	74	69	In-hospital	30 day	132	2811	28	104	537	2274	OR	0.68	0.41	1.13		No	Y
Kodvanj et al	Inflammatory Bowel Disease Is Associated with an Increased Risk for Covid-19-Related Hospitalization, but Not with Mortality: Croatian Nationwide Cohort Study	2022	H	Gut			All Cases		3067	433609					RR	0.85	0.6	1.19		Yes	Y
Kridin et al	Nineteen months into the pandemic, what have we learned about COVID-19-related outcomes in patients with psoriasis?	2022	H	Skin	50	50	All Cases		144304	144304	232	144072	234	144070	HR	0.88	0.73	1.05	0.162	Yes	Y
MacKenna et al	Risk of severe COVID-19 outcomes associated with immune-mediated inflammatory diseases and immune-modifying therapies: a	2022a	H	General			All Cases		1163438	16508627	4824	1158614	40453	16468174	HR	1.15	1.11	1.18		No	Y

	nationwide cohort stud																				
MacKenna et al	Risk of severe COVID-19 outcomes associated with immune-mediated inflammatory diseases and immune-modifying therapies: a nationwide cohort stud	2022d	H	Gut			All Cases		199037	16508627	721	198316	40453	16468174	HR	1.07	0.99	1.15		No	Y
MacKenna et al	Risk of severe COVID-19 outcomes associated with immune-mediated inflammatory diseases and immune-modifying therapies: a nationwide cohort stud	2022b	H	Joint			All Cases		272452	16508627	1856	270596	40453	16468174	HR	1.3	1.24	1.37		No	Y
MacKenna et al	Risk of severe COVID-19 outcomes associated with immune-mediated inflammatory diseases and immune-modifying therapies: a nationwide cohort stud	2022c	H	Skin			All Cases		769816	16508627	2608	767208	40453	16468174	HR	1.07	1.02	1.11		No	Y
Mahdavi et al	Factors associated with COVID-19 and its outcome in patients with rheumatoid arthritis	2022	L	Joint	52.3	48.4	All Cases	30 day	128	92	11	117	5	87						No	N
Marozoff et al	Severe COVID-19 outcomes among patients with autoimmune rheumatic diseases or transplantation: a population-based	2022	H	Joint	54.3	53.6	All Cases		6279	31130	232	6047	841	30289	OR	1.24	1.05	1.47		Yes	Y

	matched cohort study																				
Moreno-Torres et al	Systemic Autoimmune Diseases in Patients Hospitalized with COVID-19 in Spain: A Nation-Wide Registry Study	2022	H	General	67.5	66.5	In-hospital		892	116802	174	718	18864	97938	OR	0.93	0.78	1.11		No	N
Pablos et al	Clinical outcomes of hospitalised patients with COVID-19 and chronic inflammatory and autoimmune rheumatic diseases: a multicentric matched cohort study	2022	H	Joint	63	63	In-hospital		228	228	41	187	30	198						Yes	N
Pakhchanian et al	COVID-19 outcomes in patients with dermatomyositis: a registry-based cohort analysis	2022	H	Skin	58.45	58.95	All Cases		5574	5574	112	5462	147	30983	RR	0.76	0.6	0.97		Yes	Y
Qi et al	Clinical outcomes of COVID-19 patients with rheumatic diseases: a retrospective cohort study and synthesis analysis in Wuhan, China	2022	H	General	62.04	62.09	In-hospital		90	347	1	89	12	335	RR	0.31	0.04	2.44		Yes	Y
Raiker et al	254 COVID-19 related outcomes in psoriasis and psoriasis arthritis patients.	2022	H	Skin			All Cases	45 day	2288	2288					RR	0.82	0.57	1.19		Yes	Y
Raiker et al	Outcomes of COVID-19 in patients with rheumatoid arthritis: A multicenter research network study in the United States	2022	H	Joint	61.1	61.4	In-hospital		9730	9730	357	9373	328	9402	RR	1.09	0.94	1.26	0.2593	Yes	Y
Rorat et al	The course of COVID-19 in patients with	2022	H	General	69	64	In-hospital	28 day	185	8035	42	143	1155	6880						No	N

	systemic autoimmune rheumatic diseases																				
Rutter et al	COVID-19 infection, admission and death among people with rare autoimmune rheumatic disease in England: results from the RECORDER project	2022	H	General	61.7		All Cases	28 days	1874	261348	574	1300	36658	224690	RR	2.7	2.56	2.84		No	N
Shin et al	Autoimmune inflammatory rheumatic diseases and COVID-19 out- comes in South Korea: a nationwide cohort study.	2022a	H	Joint			All Cases		365	891	24	341	40	851	OR	1.69	1.01	2.84	0.046	Yes	Y
Shin et al	Autoimmune inflammatory rheumatic diseases and COVID-19 out- comes in South Korea: a nationwide cohort study.	2022b	H	Joint			All Cases		84	188	7	77	11	177	OR	1.87	0.71	4.85	0.031	Yes	Y
Shin et al	Autoimmune inflammatory rheumatic diseases and COVID-19 out- comes in South Korea: a nationwide cohort study.	2022c	H	Joint			All Cases		327	796	20	307	32	764	OR	1.81	1.02	3.18	0.04	Yes	Y
Thompson et al	Investigation Into the Effect of COVID-19 Infection on Length of Hospital Stay and Mortality in Patients With Rheumatoid Arthritis	2022	H	Joint	58	58	In-hospital		159	14021					OR	1.65	1.07	2.53	0.02	No	Y
Topless et al	Gout, Rheumatoid Arthritis, and the Risk of Death Related to Coronavirus Disease 2019:	2022a	H	General			All Cases		117	1942					OR	1.71	1.23	2.38	1.4 × 10−3	Yes	Y

	An Analysis of the UK Biobank																				
Topless et al	Gout, Rheumatoid Arthritis, and the Risk of Death Related to Coronavirus Disease 2019: An Analysis of the UK Biobank	2022b	H	Joint			All Cases		61	13063					OR	3.23	2.07	5.04	2.2 × 10−7	Yes	Y
Ungaro et al	Autoimmune and chronic inflammatory disease patients with COVID-19.	2022	H	General	63	62	All Cases		159	6633	36	123	1445	5188						No	N
Zanetti et al	Increased COVID-19 mortality in patients with rheumatic diseases: results from the CONTROL-19 study by the Italian Society for Rheumatology	2022	H	Joint	58.4		All Cases		668	1395075	62	55803			OR	3.1	2.29	4.12		No	N

v. HIV data extraction form

Authors	**Title**	**Year**	**Income**	**IS Type**	**Exposed age**	**Unexposed age**	**Case**	**Time to mortality**	**Exposed (n)**	**Unexposed (n)**	**Exposed death**	**Exposed survivors**	**Unexposed death**	**Unexposed survivors**	**Effect Measure**	**Value**	**LB**	**UB**	***p-value***	**Matched**	**Adjusted criteria met**
Bennett et al	Multicenter Study of Outcomes Among Persons With HIV Who Presented to US Emergency Departments With Suspected SARS-CoV-2	2021	H	HIV	57	59	In-hospital		201	13236	28	173	1995	11241						No	N
Bhaskaran et al	HIV infection and COVID-19 death: a population-	2021	H	HIV	48	49	All Cases		27480	17255425	25	27455	14857	17240568	HR	2.3	1.55	3.41	<0.001	No	Y

	based cohort analysis of UK primary care data and linked national death registrations within the OpenSAFELY platform																				
Boulle	Risk factors for COVID-19 death in a population HIV cohort study from the Western Cape Province, South Africa	2021	L	HIV			All Cases		3978	18330	115	3863	510	17820	HR	2.14	1.7	2.7		No	Y
Cabello et al	COVID-19 in people living with HIV: A multicenter case-series study	2021	H	HIV	46		In-hospital		63	18790	2	61	1315	17475						No	N
Durstenfield et al	Impact of HIV Infection on COVID-19 Outcomes Among Hospitalized Adults in the U.S.	2021	H	HIV	56	62.3	In-hospital		220	21308	36	184	3290	18018	OR	1.13	0.77	1.6	0.54	No	N
Flannery et al	A comparison of COVID-19 inpatients by HIV status.	2021	H	HIV	58.3	64.32	In-hospital		99	10202	25	74	2703	7499						No	N
Geretti et al	Outcomes of COVID-19 related hospitalization among people with HIV in the ISARIC WHO Clinical Characterization Protocol (UK): a prospective observational study	2021	H	HIV	56	74	In-hospital	28 days	122	47470	30	92	13969	33501	HR	1.5	1.02	2.22	0.04	No	Y
Hadi et al	Characteristics and outcomes of COVID-19 in patients with HIV: a multicentre research network study	2020	H	HIV	48.18	47.75	All Cases	30 days	404	404	20	384	15	389	RR	1.33	0.69	2.57		Yes	Y
Hedberg et al	Incidence and severity of COVID-19 in adults with	2022	H	HIV	50	50	All Cases	30 days	364	3587	6	358	44	3543						No	N

	and without diagnosis.																				
Kwapong et al	Effect of status on ICU admission and mortality among hospitalized coronavirus disease 2019 (COVID-19) patients	2022	H	HIV	52.7	52.7	In-hospital		151	185					OR	0.97	0.32	2.88		Yes	Y
Lee et al	Comparative outcomes in hospital admissions with COVID-19 in people living with and people living without : a retrospective study	2020	H	HIV	57	56	In-hospital	28 days	68	181	13	55	35	146	HR					No	Y
Looha et al	The impact of on the risk of COVID-19 death among hospitalized patients	2022	L	HIV	58	50	In-hospital		127	325925	18	109	21595	304330	OR	1.49	0.99	2.25		No	Y
Miyashita et al	Prognosis of coronavirus disease 2019 (COVID-19) in patients with infection in New York City	2021	H	HIV			In-hospital		161	8751	23	138	1235	7516	RR	1.01	0.69	1.48		No	N
Moreno-Torres et al	Predictors of in-hospital mortality in HIV-infected patients with COVID-19	2022	H	HIV	53.2	66.5	In-hospital		234	117460	22	212	18836	98624	OR	1.08	0.68	1.7	0.704	No	N
Olalla-Sierra et al	Coronavirus disease 2019 hospitalization outcomes in persons with and without in Spain	2022	H	HIV	57.9	67.4	In-hospital		98	16465	12	86	3507	12958						No	N
Park et al	COVID-19 in the largest US cohort. AIDS	2020	H	HIV			All Cases		253	504	24	165	56	324	HR	1.08	0.66	1.75		No	N
Parker et al	Clinical features and outcomes of COVID-19 admissions in a population with a high prevalence of and tuberculosis: a	2022	L	HIV	46	54	In-hospital		270	1164	71	199	296	868	OR	1.56	1.11	2.2	0.011	No	Y

	multicentre cohort study																				
Patel et al	Clinical outcomes and inflammatory markers by HIV serostatus and viral suppression in a large cohort of patients hospi- talized with COVID-19	2021	H	HIV	63	65	In-hospital		100	4513	22	78	1104	3409	HR	1.2	0.78	1.83	0.41	No	Y
Rasmussen et al	Outcomes following SARS-CoV-2 infection among individuals living with and without HIV; a Danish nationwide cohort study	2022	H	HIV	51.7	51.7	All Cases	90 days	5276	42208	4	2037	41	19721	IRR	0.7	0.3	2		Yes	Y
Rosenthal et al	Factors associated with SARS-CoV-2-related hospital outcomes among and between persons living with and without diagnosed HIV infection in New York State	2022	H	HIV			In-hospital		853	1621	200	653	414	1207	RR	0.94	0.82	1.08		Yes	N
Sigel et al	Covid-19 and people with HIV New York City	2020	H	HIV	61	60	In-hospital		88	405	18	70	81	324	SHR	1.13	0.62	2.08		Yes	N
Spence et al	COVID-19 Outcomes in a US Cohort of Persons Living with HIV (PLWH)	2022	H	HIV	51.5	51.2	In-hospital		281	1124	18	263	33	1091						Yes	N
Sun et al	COVID-19 Disease Severity among People with HIV Infection or Solid Organ Transplant in the United States: A Nationally-representative, Multicenter,	2021	H	HIV	50	47	All Cases	45 days	8270	1426984	196	8074	23831	1403153	OR	1.2	1.19	1.2	<0.01	No	Y

	Observational Cohort Study																				
Tang et al	People with have a higher risk of COVID-19 diagnosis but similar outcomes to the general population	2022	H	HIV	45	50	In-hospital		88	399	1	87	7	392	IRR	0.729	0.078	6.813		No	Y
Tesoriero et al	COVID-19 Outcomes Among Persons Living With or Without Diagnosed HIV Infection in New York State	2021	H	HIV	54		All Cases		2988	375260	207	2781	14522	360738	RR	1.3	1.13	1.48		No	N
Yang et al	Associations between HIV infection and clinical spectrum of COVID-19: a population level analysis based on US National COVID Cohort Collaborative (N3C) data	2021	H	HIV	49	47	All Cases		13170	1423452	445	12725	25685	1397767	OR	1.29	1.16	1.44		No	Y
Yendewa et al	Clinical Features and Outcomes of Coronavirus Disease 2019 Among People With Human Immunodeficiency Virus in the United States: A Multicenter Study From a Large Global Health Research Network (TriNetX)	2021	H	HIV	48.34	49.12	All Cases	30 days	1635	1609	46	1589	61	46	OR	0.74	0.5	1.08	0.145	Yes	Y

Appendix 7: Alphabetised study set, reporting effect measure imputation and repeat cohorts

Subgroup	Authors	Title	Date	Design	Country	Immunosuppressed (n)	Control (n)	Average Immunosuppressed Age	Average Control Age	Effect Size (95% CI)
Malignancy	Alpert et al	Clinical course of cancer patients with COVID-19: a retrospective cohort study	2021	Retrospective cohort study	USA	420	840	NA	NA	1.12 (0.86-1.45)
Rheumatological Conditions	Attauabi et al	Outcomes and long-term effects of COVID-19 in patients with inflammatory bowel diseases—A Danish prospective population-based cohort study with individual-level data	2022a	Prospective cohort study	Denmark	319	230087	48		3.9 (2.89-6.65)
Rheumatological Conditions	Attauabi et al	"	2022b	Prospective cohort study	Denmark	197	230087*	44		0.97 (0.24-3.86)
Immunosuppressive Agents	Belleudi et al	Direct and indirect impact of COVID-19 for patients with immune-mediated inflammatory diseases: a retrospective cohort study	2021	Retrospective cohort study	Italy	9176	4702567	56	51	2 (1.11-3.63)

Rheumatological Conditions	Belleudi et al	Direct and indirect impact of COVID-19 for patients with immune-mediated inflammatory diseases: a retrospective cohort study	2022a	Retrospective cohort study	Italy	65230	4702567	59	51	1.22 (0.95-1.56)
Rheumatological Conditions	Belleudi et al	“	2022b	Retrospective cohort study	Italy	20299*	4702567*	64	51	1.25 (0.84-1.85)
Rheumatological Conditions	Belleudi et al	“	2022c	Retrospective cohort study	Italy	22525*	4702567*	53	51	0.95 (0.56-1.59)
Rheumatological Conditions	Belleudi et al	“	2022d	Retrospective cohort study	Italy	22406*	4702567*	60	51	1.4 (0.94-2.10)
HIV	Bennett et al	Multicenter Study of Outcomes Among Persons With HIV Who Presented to US Emergency Departments With Suspected SARS-CoV-2	2021	Retrospective cohort study	USA	201	13236	57	59	0.91 (0.61-1.36)**

Rheumatological Conditions	Bertoglio et al	Poor Prognosis of COVID-19 Acute Respiratory Distress Syndrome in Lupus Erythematosus: Nationwide Cross-Sectional Population Study Of 252 119 Patients	2022	Retrospective cohort study	Brazil	319	251800	45.5	58.7	1.738 (1.56-1.91)
HIV	Bhaskaran et al	HIV infection and COVID-19 death: a population-based cohort analysis of UK primary care data and linked national death registrations within the OpenSAFELY platform	2021	Retrospective cohort study	UK	27480	17255425	48	49	2.3 (1.55-3.41)
HIV	Boulle	Risk factors for COVID-19 death in a population cohort study from the Western Cape Province, South Africa	2021	Retrospective cohort study	South Africa	3978	18330	NA	NA	2.14 (1.7-2.7)
Malignancy	Brar et al	COVID-19 severity and outcomes in patients with cancer: A matched cohort study	2020	Retrospective cohort study	USA	117	468	72.5	71.2	0.98 (0.58-1.67)
Rheumatological Conditions	Bruera et al	Patients with systemic lupus erythematosus have an increased risk of mortality, mechanical ventilation, and hospitalization from COVID-19	2022	Retrospective cohort study	USA	687	6870	NA	NA	1.39 (0.79-2.44)
HIV	Cabello et al	COVID-19 in people living with HIV: A multicenter case-series study	2021	Retrospective cohort study	Spain	63	18790	46	NA	0.43 (0.11-1.78)**

Transplantation	Caillard et al	Is COVID-19 infection more severe in kidney transplant recipients?	2021	Retrospective cohort study	France	273	273	62	63	1.55 (1.02-2.35)
Transplantation	Chavarot et al	COVID-19 severity in kidney transplant recipients is similar to nontransplant patients with similar comorbidities	2022	Retrospective cohort study	France	83	83	67.2	65.1	1.36 (0.67-2.83)
Immunosuppressive Agents	Chavez-MacGregor et al	Evaluation of COVID-19 mortality and adverse outcomes in US patients with or without cancer	2021	Retrospective cohort study	USA	4296	493020	66	48	1.74 (1.54-1.96)
Rheumatological Conditions	Chiriboga et al	Risk of COVID-19 Infection and Hospitalization in Patients With Inflammatory Rheumatic Disease Compared With the General Population	2022	Retrospective cohort study	USA	470	26434	61.8	40.2	0.25 (0.06-1.00)
Malignancy	Costa et al	“	2021b	Retrospective cohort study	Brazil	944*	315410*	NA	NA	2.85 (2.41-3.38)
Malignancy	Costa et al	“	2021c	Retrospective cohort study	Brazil	6461*	315410*	NA	NA	1.83 (1.72-1.95)

Malignancy	Costa et al	Higher severity and risk of in-hospital mortality for COVID-19 patients with cancer during the year 2020 in Brazil: A countrywide analysis of secondary data	2021a	Retrospective cohort study	Brazil	7406	315410	67	62	1.94 (1.83-2.06)
Rheumatological Conditions	Curtis et al	Characteristics, comorbidities, and outcomes of SARS-cov-2 infection in patients with autoimmune conditions treated with systemic therapies: a population-based study.	2022a	Retrospective cohort study	USA	2306	311563*	61	49	1.35 (1.09-1.68)
Rheumatological Conditions	Curtis et al	“	2022b	Retrospective cohort study	USA	421	311563*	55	49	1.24 (0.53-1.94)
Rheumatological Conditions	Curtis et al	“	2022c	Retrospective cohort study	USA	811	311563	52	49	1.11 (0.68-1.82)

Rheumatological Conditions	D'Silva et al	COVID-19 outcomes in patients with systemic autoimmune rheumatic diseases compared to the general population: a US multicenter, comparative cohort study	2022	Retrospective cohort study	USA	2379	2379	58	58	1.18 (0.88-1.58)
Malignancy	Dai et al	Patients with Cancer Appear More Vulnerable to SARS-CoV-2: A Multicenter Study during the COVID-19 Outbreak	2020	Retrospective cohort study	China	105	536	64	63.5	2.17 (0.81-5.15)
Malignancy	de Azambuja et al	Impact of solid cancer on in-hospital mortality overall and among different subgroups of patients with COVID-19: a nationwide, population-based analysis	2020	Retrospective cohort study	Belgium	892	9594	75	70	1.34(1.13-1.58)
HIV	Durstenfeld et al	Impact of HIV Infection on COVID-19 Outcomes Among Hospitalized Adults in the U.S.	2021	Retrospective cohort study	USA	220	21308	56	62.3	1.13 (0.77-1.6)
Malignancy	Fernández-Cruz et al	Higher mortality of hospitalized haematologic patients with COVID-19 compared to non-haematologic is driven by thrombotic complications and development	2022	Retrospective cohort study	Spain	71	142	70.7	69.6	2.74 (1.44-5.20)**

Rheumatological Conditions	Ferri	Prevalance and Death Rate of COVID-19 in Autoimmune Systemic Diseases in the First Three Pandemic Waves. Relationship with Disease Subgroups and Ongoing Therapies	2022	Retrospective cohort study	Italy	316	4051401	59		1.25 (0.7-2.22)**
Rheumatological Conditions	Figueroa-Parra et al	Risk of severe COVID-19 outcomes associated with rheumatoid arthritis and phenotypic subgroups: a retrospective, comparative, multicentre cohort study	2022	Retrospective cohort study	USA	582	2875	62	61	1.53 (0.94-2.48)
Transplantation	Fisher et al	Outcomes of COVID-19 in hospitalized solid organ transplant recipients compared to a matched cohort of non-transplant patients at a national healthcare system in the United States	2021	Retrospective cohort study	USA	128	3907	60	60	1.93 (1.18-3.15)
HIV	Flannery et al	A comparison of COVID-19 inpatients by HIV status.	2021	Retrospective cohort study	USA	99	10202	58.3	64.32	0.94 (0.59-1.48)**
Malignancy	Fu et al	COVID-19 outcomes in hospitalized patients with active cancer: Experiences from a major New York City health care system	2021a	Retrospective cohort study	USA	233	3953	71.2	62.2	1.89 (1.33-2.67)

Malignancy	Fu et al	“	2021b	Retrospective cohort study	USA	69*	3953*	NA	NA	4.39 (2.72-7.09)**
Malignancy	Fu et al	“	2021c	Retrospective cohort study	USA	164*	3953*	NA	NA	19.35 (13.37-27.99)**
Immunosuppressive Agents	Garneau et al	Clinical outcomes of patients previously treated with B-cell depletion therapy hospitalized with COVID-19: results from the Johns Hopkins Crown Registry	2022	Retrospective cohort study	USA	50	212	57.4	57.4	1.44 (0.38-5.52)**
HIV	Geretti et al	Outcomes of COVID-19 related hospitalization among people with HIV in the ISARIC WHO Clinical Characterization Protocol (UK): a prospective observational study	2021	Prospective cohort study	UK	122	47470	56	74	1.5 (1.02-2.22)
Rheumatological Conditions	Gisondi et al	Incidence rates of hospitalization and death from COVID-19 in patients with psoriasis receiving biological treatment: A Northern Italy experience	2022	Retrospective cohort study	Italy	6481	144909	53.4	52.3	0.42 (0.07-1.38)

Malignancy	Hachem et al	Comparing the outcome of COVID-19 in cancer and non-cancer patients: An international multicenter study.	2020	Retrospective cohort study	International	186	385	NA	NA	2.03 (1.25-3.28)**
HIV	Hadi et al	Characteristics and outcomes of COVID-19 in patients with HIV: a multicentre research network study	2020	Retrospective cohort study	USA	404	404	48.18	47.75	1.33 (0.69-2.57)
Rheumatological Conditions	Hadi et al	Incidence, outcomes, and impact of COVID-19 on inflammatory bowel disease: propensity matched research network analysis	2022a	Retrospective cohort study	USA	4310	4310	49.72	49.79	0.947 (0.71-1.26)
Rheumatological Conditions	Hadi et al	“	2022b	Retrospective cohort study	USA	2082*	4310*	NA	NA	0.759 (0.51-1.13)
Rheumatological Conditions	Hadi et al	“	2022c	Retrospective cohort study	USA	2190*	4310*	NA	NA	1.314 (0.85-2.03)
Transplantation	Hadi et al	Outcomes of COVID-19 in solid organ transplant recipients: a propensity-matched analysis of a large research network	2022a	Retrospective cohort study	USA	2289	2289	54.5	55.2	0.99 (0.73-1.34)

Transplantation	Hadi et al	“	2022b	Retrospective cohort study	USA	1511*	2289*	52	30	0.78 (0.56-1.08)
Transplantation	Hadi et al	“	2022c	Retrospective cohort study	USA	183*	2289*	NA	NA	3.88 (2.2-6.81)
HIV	Hedberg et al	Incidence and severity of COVID-19 in adults with and without HIV diagnosis.	2022	Retrospective cohort study	Sweden	364	3587	50	50	1.35 (0.57-3.19)**
Malignancy	Johannesen et al	COVID-19 in cancer patients, risk factors for disease and adverse outcome, a population-based study from Norway	2021a	Retrospective cohort study	Norway	547	7863	NA	NA	0.99 (0.68-1.42)
Malignancy	Johannesen et al	“	2021b	Retrospective cohort study	Norway	54*	7863*	NA	NA	1 (0.28-3.65)
Malignancy	Johannesen et al	“	2021c	Retrospective cohort study	Norway	493*	7863*	NA	NA	0.99 (0.68-1.44)
Rheumatological Conditions	Kjeldsen et al	Outcome of COVID-19 in hospitalized patients with chronic inflammatory diseases. A population based national register study in Denmark	2022	Retrospective cohort study	Denmark	132	2811	74	69	0.68 (0.41-1.13)

Rheumatological Conditions	Kodvanj et al	Inflammatory Bowel Disease Is Associated with an Increased Risk for Covid-19-Related Hospitalization, but Not with Mortality: Croatian Nationwide Cohort Study	2022	Retrospective cohort study	Croatia	3067	433609	NA	NA	0.85 (0.6-1.19)
Rheumatological Conditions	Kridin et al	Nineteen months into the pandemic, what have we learned about COVID-19-related outcomes in patients with psoriasis?	2022	Retrospective cohort study	Israel	144304	144304	50	50	0.88 (0.73-1.05)
HIV	Kwapong et al	Effect of HIV status on ICU admission and mortality among hospitalized coronavirus disease 2019 (COVID-19) patients	2022	Retrospective cohort study	USA	151	185	52.7	52.7	0.97 (0.32-2.88)
HIV	Lee et al	Comparative outcomes in hospital admissions with COVID-19 in people living with HIV and people living without HIV: a retrospective study	2020	Retrospective cohort study	UK	68	181	57	56	0.99 (0.49-2.00)**
HIV	Looha et al	The impact of HIV on the risk of COVID-19 death among hospitalized patients	2022	Retrospective cohort study	Iran	127	325925	58	50	1.49 (0.99-2.25)
Malignancy	Lunski et al	Multivariate mortality analyses in COVID-19: comparing patients with cancer and patients without cancer in Louisiana	2020a	Retrospective cohort study	USA	312	4833	NA	NA	2.03 (1.44-2.87)

Malignancy	Lunski et al	“	2020b	Retrospective cohort study	USA	157	1460	NA	NA	1.36 (0.89-2.08)
Rheumatological Conditions	MacKenna et al	Risk of severe COVID-19 outcomes associated with immune-mediated inflammatory diseases and immune-modifying therapies: a nationwide cohort study	2022a	Retrospective cohort study	UK	1163438	16508627	NA	NA	1.15 (1.11-1.18)
Rheumatological Conditions	MacKenna et al	“	2022b	Retrospective cohort study	UK	272452*	16508627*	NA	NA	1.3 (1.24-1.37)
Rheumatological Conditions	MacKenna et al	“	2022c	Retrospective cohort study	UK	769816*	16508627*	NA	NA	1.07 (1.02-1.11)
Rheumatological Conditions	MacKenna et al	“	2022d	Retrospective cohort study	UK	199037*	16508627*	NA	NA	1.07 (0.99-1.15)

Rheumatological Conditions	Mahdavi et al	Factors associated with COVID-19 and its outcome in patients with rheumatoid arthritis	2022	Retrospective cohort study	Iran	128	92	52.3	48.4	1.64 (0.55-4.88)**
Malignancy	Mangone et al	Cumulative COVID-19 incidence, mortality and prognosis in cancer survivors: a population-based study in Reggio Emilia, Northern Italy	2021	Retrospective cohort study	Italy	447	4094	NA	NA	1.54 (1.18-2)
Transplantation	Mansoor et al	Clinical Characteristics, Hospitalization and Mortality Rates of COVID-19 Among Liver Transplant Patients in the United States: A Multi-Center Research Network Study	2020	Retrospective cohort study	USA	125	125	57.03	59.83	1 (0.43-2.32)
Rheumatological Conditions	Marozoff et al	Severe COVID-19 outcomes among patients with autoimmune rheumatic diseases or transplantation: a population-based matched cohort study	2022	Retrospective cohort study	Canada	6279	31130	54.3	53.6	1.24 (1.05-1.47)
Transplantation	Marozoff et al	Severe COVID-19 outcomes among patients with autoimmune rheumatic diseases or transplantation: a population-based matched cohort study	2022	Retrospective cohort study	Canada	222	1106	54.3	54	5.48 (2.82-10.63)

Malignancy	Martinez-Lopez et al	Multiple myeloma and SARS-CoV-2 infection: clinical characteristics and prognostic factors of inpatient mortality	2020	Retrospective cohort study	Spain	167	167	71	71	1.71 (1.06-2.78)**
HIV	Miyashita et al	Prognosis of coronavirus disease 2019 (COVID-19) in patients with HIV infection in New York City	2021	Retrospective cohort study	USA	161	8751	NA	NA	1.01 (0.69-1.48)
Malignancy	Miyashita et al	Do patients with cancer have a poorer prognosis of COVID-19? An experience in New York City.	2020	Retrospective cohort study	Italy	334	5354	NA	NA	1.15 (0.84-1.57)
Transplantation	Molnar et al	Outcomes of critically ill solid organ transplant patients with COVID-19 in the United States	2020	Retrospective cohort study	USA	98	288	58	61	0.92 (0.7-1.22)
HIV	Moreno-Torres et al	Predictors of in-hospital mortality in HIV-infected patients with COVID-19	2022	Retrospective cohort study	Spain	234	117460	53.2	66.5	1.08 (0.68-1.7)
Rheumatological Conditions	Moreno-Torres et al	Systemic Autoimmune Diseases in Patients Hospitalized with COVID-19 in Spain: A Nation-Wide Registry Study	2022	Retrospective cohort study	Spain	892	116802	67.5	66.5	0.93 (0.78-1.11)
Immunosuppressive Agents	Myint et al	Routine use of immunosuppressants is associated with mortality in hospitalised patients with COVID-19	2021	Retrospective cohort study	International	118	1066	74	NA	1.87 (1.30-2.69)
Transplantation	Nair et al	An early experience on the effect of solid organ transplant status on hospitalized COVID-19 patients	2021	Retrospective cohort study	USA	82	1625	61.8	62.7	1.34 (1.03-1.74)

HIV	Olalla-Sierra et al	Coronavirus disease 2019 hospitalization outcomes in persons with and without HIV in Spain	2022	Retrospective cohort study	Spain	98	16465	57.9	67.4	0.51 (0.28-0.94)**
Transplantation	Osmanodja et al	Undoubtedly, kidney transplant recipients have a higher mortality due to COVID-19 disease compared to the general population	2021	Retrospective cohort study	Germany	114	209960	NA	NA	3.27 (1.71-6.26)
Transplantation	Ozturk et al	Mortality analysis of COVID-19 infection in chronic kidney disease, haemodialysis and renal transplant patients compared with patients without kidney disease: a nationwide analysis from Turkey	2020	Retrospective cohort study	Turkey	81	450	48	51	1.897 (0.76-4.73)
Rheumatological Conditions	Pablos et al	Clinical outcomes of hospitalised patients with COVID-19 and chronic inflammatory and autoimmune rheumatic diseases: a multicentric matched cohort study	2022	Retrospective cohort study	Spain	228	228	63	63	1.44 (0.87-2.41)**
Rheumatological Conditions	Pakhchanian et al	COVID-19 outcomes in patients with dermatomyositis: a registry-based cohort analysis	2022	Retrospective cohort study	USA	5574	5574	58.45	58.95	0.76 (0.6-0.97)
HIV	Park et al	COVID-19 in the largest US HIV cohort	2020	Retrospective cohort study	USA	253	504	NA	NA	1.08 (0.66-1.75)

HIV	Parker et al	Clinical features and outcomes of COVID-19 admissions in a population with a high prevalence of HIV and tuberculosis: a multicentre cohort study	2022	Retrospective cohort study	South Africa	270	1164	46	54	1.56 (1.11-2.2)
Malignancy	Passamonti et al	Clinical characteristics and risk factors associated with COVID-19 severity in patients with haematological malignancies in Italy: a retrospective, multicentre, cohort study	2020	Retrospective cohort study	Italy	536	29282	68		2.04 (1.77-2.34)
HIV	Patel et al	Clinical outcomes and inflammatory markers by HIV serostatus and viral suppression in a large cohort of patients hospitalized with COVID-19	2021	Retrospective cohort study	USA	100	4513	63	65	1.2 (0.78-1.83)
Malignancy	Péron et al	Covid-19 presentation and outcomes among cancer patients: A matched case-control study	2021	Retrospective cohort study	France	108	193	76	77	2 (1.20-3.40)
Rheumatological Conditions	Qi et al	Clinical outcomes of COVID-19 patients with rheumatic diseases: a retrospective cohort study and synthesis analysis in Wuhan, China	2022	Retrospective cohort study	China	90	347	62.04	62.09	0.31 (0.04-2.44)

Malignancy	Raad et al	International Multicenter Study Comparing Cancer to Non-Cancer Patients with COVID-19: Impact of Risk Factors and Treatment Modalities on Survivorship	2022	Retrospective cohort study	International	1115	2851	61	50	1.46 (1.03-2.07)
Malignancy	Raez et al	Mortality and prognostic factors in hospitalized COVID-19 patients with cancer: an analysis from a large healthcare system in the United States	2022	Retrospective cohort study	USA	265	4605	71	60	1.48 (1.08-2.01)
Rheumatological Conditions	Raiker et al	254 COVID-19 related outcomes in psoriasis and psoriasis arthritis patients.	2022	Retrospective cohort study	USA	2288	2288	NA	NA	0.82 (0.57-1.19)
Rheumatological Conditions	Raiker et al	Outcomes of COVID-19 in patients with rheumatoid arthritis: A multicenter research network study in the United States	2022	Retrospective cohort study	USA	9730	9730	61.1	61.4	1.09 (0.94-1.26)
Transplantation	Ranabothu et al	Outcomes of COVID-19 in solid organ transplants	2020a	Retrospective cohort study	USA	288	30285	55.4	47.6	3.15 (2.17-4.57)
Transplantation	Ranabothu et al	“	2020b	Retrospective cohort study	USA	224*	30285*	55.4	47.6	2.61 (1.66-4.10)

HIV	Rasmussen et al	Outcomes following SARS-CoV-2 infection among individuals living with and without HIV; a Danish nationwide cohort study	2022	Retrospective cohort study	Denmark	5276	42208	51.7	51.7	0.7(0.3-2.0)
Rheumatological Conditions	Rorat et al	The course of COVID-19 in patients with systemic autoimmune rheumatic diseases	2022	Retrospective cohort study	Poland	185	8035	69	64	1.75 (1.23-2.48)
HIV	Rosenthal et al	Factors associated with SARS-CoV-2-related hospital outcomes among and between persons living with and without diagnosed HIV infection in New York State	2022	Retrospective cohort study	USA	853	1621	NA	NA	0.94 (0.82-1.08)
Malignancy	Rugge et al	SARS-CoV-2 infection in the Italian Veneto region: adverse outcomes in patients with cancer.	2020a	Retrospective cohort study	Italy	723	8552	NA	NA	3.64 (2.9-4.59)**
Malignancy	Rugge et al	“	2020b	Retrospective cohort study	Italy	81*	8552*	NA	NA	2.39 (1.24-4.58)
Rheumatological Conditions	Rutter et al	COVID-19 infection, admission and death among people with rare autoimmune rheumatic disease in England: results from the RECORDER project	2022	Retrospective cohort study	UK	1874	261348	61.7		2.7 (2.56-2.84)

Transplantation	Sahota et al	Incidence, Risk Factors, and Outcomes of COVID-19 Infection in a Large Cohort of Solid Organ Transplant Recipients	2022a	Retrospective cohort study	USA	600	312011	55.7	57.3	9.38 (7.47-11.78)
Transplantation	Sahota et al	"	2022b	Retrospective cohort study	USA	438*	312011*	NA	NA	9.51 (7.28-12.39)
Transplantation	Sahota et al	"	2022c	Retrospective cohort study	USA	114*	312011*	62	57.3	5.25 (2.74-10.05)
Malignancy	Seyyedsaleh i et al	Hospital and post-discharge mortality in COVID-19 patients with a preexisting cancer diagnosis in Iran	2022a	Retrospective cohort study	Iran	1090	5517	58.16	57.87	4.4 (3.80-5.20)
Malignancy	Seyyedsaleh i et al	"	2022b	Retrospective cohort study	Iran	423*	5517*	51.6	57.87	5.07 (3.95-6.51)
Malignancy	Seyyedsaleh i et al	"	2022c	Retrospective cohort study	Iran	667*	5517*	62.3	57.87	4.13 (3.41-5.01)
Malignancy	Shi et al	Association of Cancer with Risk and Mortality of COVID-19: Results from the UK Biobank	2020	Retrospective cohort study	UK	256	1306	61.36	56.11	1.04 (0.71-1.51)

Rheumatological Conditions	Shin et al	Autoimmune inflammatory rheumatic diseases and COVID-19 outcomes in South Korea: a nationwide cohort study.	2022a	Retrospective cohort study	South Korea	365	891	NA	NA	1.69 (1.01-2.84)
Rheumatological Conditions	Shin et al	"	2022b	Retrospective cohort study	South Korea	84	188	NA	NA	1.87 (0.71-4.85)
Rheumatological Conditions	Shin et al	"	2022c	Retrospective cohort study	South Korea	327	796	NA	NA	1.81 (1.02-3.18)
HIV	Sigel et al	Covid-19 and people with HIV infection: outcomes for hospitalized patients in New York City	2020	Retrospective cohort study	USA	88	405	61	60	1.13 (0.62-2.08)
HIV	Spence et al	COVID-19 Outcomes in a US Cohort of Persons Living with HIV (PLWH)	2022	Retrospective cohort study	USA	281	1124	51.5	51.2	2.26 (1.25-4.08)
Immunosuppressive Agents	Suarez-Garcia et al	In-hospital mortality among immunosuppressed patients with COVID-19: Analysis from a national cohort in Spain	2021a	Retrospective cohort study	Spain	2111	11095*	71	66.5	1.6 (1.43-1.79)

Immunosuppressive Agents	Suarez-Garcia et al	In-hospital mortality among immunosuppressed patients with COVID-19: Analysis from a national cohort in Spain	2021b	Retrospective cohort study	Spain	570*	11095*	NA	NA	2.16 (1.8-2.61)
Immunosuppressive Agents	Suarez-Garcia et al	In-hospital mortality among immunosuppressed patients with COVID-19: Analysis from a national cohort in Spain	2021c	Retrospective cohort study	Spain	183*	11095*	NA	NA	1.97 (1.33-2.91)
Malignancy	Suarez-Garcia et al	In-hospital mortality among immunosuppressed patients with COVID-19: Analysis from a national cohort in Spain	2021a	Retrospective cohort study	Spain	358	11095*	71	66.5	2.31 (1.76-3.03)
Malignancy	Suarez-Garcia et al	“	2021b	Retrospective cohort study	Spain	1081	11095*	73.2	66.5	1.39 (1.18-1.63)
Transplantation	Suarez-Garcia et al	“	2021	Retrospective cohort study	Spain	166	11095	63.5	66.5	3.1 (2.23-4.26)
Immunosuppressive Agents	Suarez-Garcia et al	“	2021d	Retrospective cohort study	Spain	394*	11095*	NA	NA	2.06 (1.64-2.6)

HIV	Sun et al	COVID-19 Disease Severity among People with HIV Infection or Solid Organ Transplant in the United States: A Nationally-representative, Multicenter, Observational Cohort Study	2021	Retrospective cohort study	USA	8270	1426984	50	47	1.2 (1.19-1.2)
Malignancy	Sun et al	Rates of COVID-19-related Outcomes in Cancer compared to non-Cancer Patients	2020	Retrospective cohort study	USA	67	256	62	50	5.67 (1.49-21.59)
Transplantation	Sun et al	COVID-19 Disease Severity among People with HIV Infection or Solid Organ Transplant in the United States: A Nationally-representative, Multicenter, Observational Cohort Study	2021	Retrospective cohort study	USA	11392	1426984*	57	47	3.38 (3.35-3.41)
Transplantation	Swan et al	Hospitalization and survival of solid organ transplant recipients with coronavirus disease 2019: A propensity matched cohort study	2022	Retrospective cohort study	USA	100	500	57	58	1.15 (0.64-2.08)
HIV	Tang et al	People with HIV have a higher risk of COVID-19 diagnosis but similar outcomes to the general population	2022	Retrospective cohort study	USA	88	399	45	50	0.729 (0.078-6.81)
HIV	Tesoriero et al	COVID-19 Outcomes Among Persons Living With or Without Diagnosed HIV Infection in New York State	2021	Retrospective cohort study	USA	2988	375260	54	NA	1.3 (1.13-1.48)

Rheumatological Conditions	Thompson et al	Investigation Into the Effect of COVID-19 Infection on Length of Hospital Stay and Mortality in Patients With Rheumatoid Arthritis	2022	Retrospective cohort study	USA	159	14021	58	58	1.65 (1.07-2.53)
Rheumatological Conditions	Topless et al	Gout, Rheumatoid Arthritis, and the Risk of Death Related to Coronavirus Disease 2019: An Analysis of the UK Biobank	2022a	Retrospective cohort study	UK	117	1942	NA	NA	1.71 (1.23-2.38)
Rheumatological Conditions	Topless et al	“	2022b	Retrospective cohort study	UK	61	13063	NA	NA	3.23 (2.07-5.04)
Malignancy	Udovico et al	High mortality in patients with active malignancy and severe COVID-19: Results from an Austrian multicenter registry during the first period of the COVID-19 …	2022	Retrospective cohort study	Austria	89	5386	74	76	4.59 (2.26-9.3)
Rheumatological Conditions	Ungaro et al	Autoimmune and chronic inflammatory disease patients with COVID-19.	2022	Retrospective cohort study	USA	159	6633	63	62	1.05 (0.72-1.53)
Transplantation	Webb et al	Liver transplantation does not significantly increase risk of mortality from SARS-CoV-2 infection: International registry data	2020	Retrospective cohort study	UK	151	627	60	73	0.63 (0.4-0.98)

Malignancy	Westblade et al	SARS-CoV-2 viral load predicts mortality in patients with and without cancer who are hospitalized with COVID-19	2020a	Retrospective cohort study	USA	100	2914	72	65	1.29 (0.84-2.0)**
Malignancy	Westblade et al	"	2020b	Retrospective cohort study	USA	60*	2914*	NA	NA	1.29 (0.74-2.26)**
HIV	Yang et al	Associations between HIV infection and clinical spectrum of COVID-19: a population level analysis based on US National COVID Cohort Collaborative (N3C) data	2021	Retrospective cohort study	USA	13170	1423452	49	47	1.29 (1.16-1.44)
HIV	Yendewa et al	Clinical Features and Outcomes of Coronavirus Disease 2019 Among People With Human Immunodeficiency Virus in the United States: A Multicenter Study From a Large Global Health Research Network (TriNetX)	2021	Retrospective cohort study	USA	1635	1609	48.34	49.12	0.74 (0.5-1.08)
Malignancy	Yigenoglu et al	The outcome of COVID-19 in patients with hematological malignancy.	2021	Retrospective cohort study	Turkey	740	740	56	56	2.21 (1.55-3.15)

Immunosuppressive Agents	Yousaf et al	Clinical outcomes of COVID-19 in patients taking tumor necrosis factor inhibitors or methotrexate: a multicenter research network study.	2021	Retrospective cohort study	International	213	213	55.1	54.9	0.87 (0.42-1.78)
Rheumatological Conditions	Zanetti et al	Increased COVID-19 mortality in patients with rheumatic diseases: results from the CONTROL-19 study by the Italian Society for Rheumatology	2022	Retrospective cohort study	Italy	668	1395075	58.4		3.1 (2.29-4.12)
TOTAL						**1542097**	**56248181**			

*Figures excluded from totals to prevent multiple counts from same cohorts

** Imputed figures

Appendix 8: Exclusion Justifications

A. Phase 1 Exclusion Justifications

Authors	Title	Year	Exclusion Factor
Abate, H. K. and Mekonnen, C. K. and Ferede, Y. M.	Depression Among HIV-Positive Pregnant Women at Northwest Amhara Referral Hospitals During COVID-19 Pandemic	2021	Wrong outcome
Abdulbasit, M. and Salameh, O. K. and Dauleh, M. M. and Zebi, A. M. and Verma, N. and Ghahramani, N.	Mortality among ESKD patients with COVID-19: comparison between kidney transplant and hemodialysis	2021	Insufficient original data
Abelenda-Alonso, G. and Rombauts, A. and Gudiol, C. and Oriol, I. and Simonetti, A. and Coloma, A. and RodrÃguez-Molinero, A. and Izquierdo, E. and DÃaz-Brito, V. and SanmartÃ, M. and PadullÃ©s, A. and Grau, I. and Ras, M. and Bergas, A. and Guillem, L. and Blanco-ArÃ©valo, A. and Alvarez-Pouso, C. and PallarÃ©s, N. and Videla, S. and TebÃ©, C. and CarratalÃ , J.	Immunomodulatory therapy, risk factors and outcomes of hospital-acquired bloodstream infection in patients with severe COVID-19 pneumonia: a Spanish case-control matched multicentre study (BACTCOVID)	2021	Wrong outcome
Abernathy, M. E. and Dam, K. A. and Esswein, S. R. and Jette, C. A. and Bjorkman, P. J.	How Antibodies Recognize Pathogenic Viruses: Structural Correlates of Antibody Neutralization of HIV-1, SARS-CoV-2, and Zika	2021	Wrong outcome
Ademas, A. and Adane, M. and Keleb, A. and Berihun, G. and Lingerew, M. and Sisay, T. and Hassen, S. and Getachew, M. and Tesfaw, G. and Getaneh Feleke, D. and Addisu, E. and Berhanu, L. and Abebe, M. and Gizeyatu, A. and Abate, H. and Derso, A.	COVID-19 Prevention Practices and Associated Factors among Diabetes and HIV/AIDS Clients in South-Wollo Zone, Ethiopia: A Health Facility-Based Cross-Sectional Study	2021	Wrong outcome
Adugna, A. and Azanaw, J. and Sharew Melaku, M.	The Effect of COVID-19 on Routine HIV Care Services from Health Facilities in Northwest Ethiopia	2021	Wrong outcome
Aggarwal, A. and Akerman, A. and Milogiannakis, V. and Silva, M. R. and Walker, G. and Stella, A. O. and Kindinger, A. and Angelovich, T. and Waring, E. and Amatayakul-Chantler, S. and Roth, N. and Manni, S. and Hauser, T. and Barnes, T. and Condylios, A. and Yeang, M. and Wong, M. and Jean, T. and Foster, C. S. P. and Christ, D. and Hoppe, A. C. and Munier, M. L. and Darley, D. and Churchill, M. and Stark, D. J. and Matthews, G. and Rawlinson, W. D. and Kelleher, A. D. and Turville, S. G.	SARS-CoV-2 Omicron BA.5: Evolving tropism and evasion of potent humoral responses and resistance to clinical immunotherapeutics relative to viral variants of concern	2022	Wrong outcome
Aggarwal, R. and Agrawal, A. and Gurtoo, A. and Suman, V. and Meena, S. and Prakash, A.	High Mortality Unaffected by Age, Gender and Steroid Use is the Hallmark of COVID-19 in Diabetes: Observations from a Retrospective Analysis during Peak of 2020 Pandemic in India	2021	Wrong population
Agrawal, Narendra and Singh, Reema and Sharma, Sanjeev Kumar and Naithani, Rahul and Bhargava, Rahul and Choudhary, Dharma and Jeyaraman, Preethi and Bansal, Sachin and Doval, Divya and Kh and elwal, Vipin	Outcomes of COVID-19 in Hematopoietic Stem Cell Transplant Recipients: Multicenter Retrospective Analysis	2022	n<50
Aguolu, O. G. and Malik, A. A. and Ahmed, N. and Omer, S. B.	Overcoming Vaccine Hesitancy for Future COVID-19 and HIV Vaccines: Lessons from Measles and HPV Vaccines	2022	Wrong population
Ahanchian, H. and Moazzen, N. and Saeidinia, A. and Joghatayi, S. H. and Khoshkhui, M. and Aelami, M. H. and Haghi, N. S. M. and Rezaei, N.	Death Due to COVID-19 in an Infant with Combined Immunodeficiencies	2021	Paediatric data
Ahearn, A. J. and Maw, T. T. and Mehta, R. and Emamaullee, J. and Kim, J. and Blodget, E. and Kahn, J. and Sher, L. and Genyk, Y.	A Programmatic Response, Including Bamlanivimab or Casirivimab-Imdevimab Administration, Reduces Hospitalization and Death in COVID-19 Positive Abdominal Transplant Recipients	2022	Wrong population

Ahmed, N. S. and Nega, S. S. and Deyessa, N. and Gebremariam, T. H. and Ahmed, H. Y. and Etissa, E. K. and Huluka, D. K.	Characteristics and outcomes of COVID-19 among people living with HIV at Eka Kotebe General Hospital, Addis Ababa, Ethiopia	2022	Wrong population
Ahmed, Sakir and Gasparyan, Armen Yuri and Zimba, Olena	Comorbidities in rheumatic diseases need special consideration during the COVID-19 pandemic	2021	Wrong outcome
Ajami, M. and Nazari, M. and Mahmoodzadeh, H. and Moazzeni, S. M.	Recombinant CD137-Fc, its synthesis, and applications for improving the immune system functions, such as tumor immunotherapy and to reduce the inflammation due to the novel coronavirus	2021	Wrong population
Akama-Garren, E. H. and Li, J. X.	Prior immunosuppressive therapy is associated with mortality in COVID-19 patients: A retrospective study of 835 patients	2021	Single centre
Akelew, Y. and Andualem, H. and Ebrahim, E. and Atnaf, A. and Hailemichael, W.	Immunomodulation of COVID-19 severity by helminth co-infection: Implications for COVID-19 vaccine efficacy	2022	Incorrect study design
Akhtar, H. and Khalid, S. and Rahman, F. U. and Ali, S. and Afridi, M. and Khader, Y. S. and Hassan, F. and Akhtar, N. and Khan, M. M. and Ikram, A.	Delayed admissions and efficacy of steroid use in patients with critical and severe COVID-19: an apprehensive approach	2021	Indirect mortality
Akyala, A. I. and Iwu, C. J.	Novel severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) co-infection with HIV: clinical case series analysis in North Central Nigeria	2020	n<50
Al Azzi, Y. and Loarte, P. and Pynadath, C. and Liriano, L. and Ajaimy, M. and Kapoor, S. and Yaffe, H. and Le, M. and Graham, J. and Rocca, J. and Greenstein, S. and Kinkhabwala, M. and Akalin, E.	Decreased Mortality from Sars-CoV-2 Infection in Kidney Transplant Recipients Over the Course of the Pandemic	2022	Duplicate
Al Azzi, Y. and Pynadath, C. and Loarte, P. and Alani, O. and Liriano-Ward, L. and Ajaimy, M. and Bartash, R. and Graham, J. and Le, M. and Yaffe, H. and Greenstein, S. and Rocca, J. and Kinkhabwala, M. and Akalin, E.	Variation of mortality from sars-cov-2 infection in kidney transplant recipients over the course of the pandemic	2021	Single centre
Alakeel, Y. S. and Alharbi, E. F. and Alhaidal, H. A. and Jumaa, A. M. and Albaiahy, L. K. and Alsagami, N. S. and Alshahrani, S. A.	The effects of the antecedent use of inhaled steroid on the clinical course of COVID-19: A retrospective study of asthmatic patients	2022	Immunosuppressio n as treatment
Alasfar, Sami and Avery, Robin K	The impact of COVID-19 on kidney transplantation	2020	Indirect mortality
Alberca, Ricardo Wesley and Alberca, Gabriela Gama Freire and Netto, Lucas Chaves and Orfali, Raquel LeÃ£o and Gozzi-Silva, Sarah Cristina and da Silva Duarte, Alberto JosÃ© and Aoki, Valeria and Sato, Maria Notomi and Benard, Gil	COVID-19 Severity and Mortality in Solid Organ Transplantation: Differences between Liver, Heart, and Kidney Recipients	2021	Single centre
Aldea, D. and Martinez, T. and Miller, S. and Miklin, D. and Depasquale, E. and Vaidya, A. and Wolfson, A.	Transplant Recipient Characteristics in COVID vs Non COVID Cause of Death	2022	Insufficient original data
Alfishawy, M. and Elbendary, A. and Mohamed, M. and Nassar, M.	COVID-19 Mortality in Transplant Recipients	2020	Incorrect study design
Al-Hajeri, H. and Baroun, F. and Abutiban, F. and Al-Mutairi, M. and Ali, Y. and Alawadhi, A. and Albasri, A. and Aldei, A. and AlEnizi, A. and Alhadhood, N. and Al-Herz, A. and Alkadi, A. and Alk and eri, W. and Almathkoori, A. and Almutairi, N. and Alsayegh, S. and Alturki, A. and Bahbahani, H. and Dehrab, A. and Ghanem, A. and Haji Hasan, E. and Hayat, S. and Saleh, K. and Tarakmeh, H.	Therapeutic role of immunomodulators during the COVID-19 pandemic- a narrative review	2022	Immunosuppressio n as treatment
Ali Malekhosseini, S. and Nikoupour, H. and Gholami, S. and Shamsaeefar, A. and Arasteh, P. and Kazemi, K. and Dehghani, M. and Eghlimi, H. and Raeisi Shahraki, H. and Roozbeh, J. and Rezaianzadeh, A. and Nikeghbalian, S.	A Report of 85 Cases of COVID-19 and Abdominal Transplantation From a Single Center: What Are the Associated Factors With Death Among Organ Transplantation Patients	2021	Single centre

Ali, Tariq and Al-Ali, Ali and Fajji, Layal and Hammad, Ehab and Nazmi, Ahmed and Alahmadi, Ibrahim and Aleid, Hassan and Ullah, Asad and Shah, Yaser and Broering, Dieter	Coronavirus disease-19: disease severity and outcomes of solid organ transplant recipients: different spectrums of disease in different populations?	2021	Single centre
Alunno, A. and Najm, A. and Machado, P. M. and Bertheussen, H. and Burmester, G. R. and Carubbi, F. and De Marco, G. and Giacomelli, R. and Hermine, O. and Isaacs, J. D. and KonÃ©-Paut, I. and Magro-Checa, C. and McInnes, I. and Meroni, P. L. and Quartuccio, L. and Ramanan, A. V. and Ramos-Casals, M. and RodrÃguez Carrio, J. and Schulze-Koops, H. and Stamm, T. A. and Tas, S. W. and Terrier, B. and McGonagle, D. G. and Mariette, X.	EULAR points to consider on pathophysiology and use of immunomodulatory therapies in COVID-19	2021	Immunosuppressio n as treatment
Alunno, A. and Najm, A. and Mariette, X. and De Marco, G. and Emmel, J. and Mason, L. and McGonagle, D. G. and Machado, P. M.	Immunomodulatory therapies for SARS-CoV-2 infection: a systematic literature review to inform EULAR points to consider	2021	Immunosuppressio n as treatment
Amrouche, T. and Chikindas, M. L.	Probiotics for immunomodulation in prevention against respiratory viral infections with special emphasis on COVID-19	2022	Wrong population
Anaya-Albinagorta, A. V. and Balcazar-Aniceto, K. X. and Murga-Mogollon, C.	Mortality in patients with kidney transplantation and SARS-CoV-2 infection. [Spanish]	2022	Insufficient original data
Anggraeni, A. T. and Soedarsono, S. and Soeprijanto, B.	Concurrent COVID-19 and Pneumocystis jirovecii pneumonia: The importance of radiological diagnostic and HIV testing	2021	Incorrect study design
Anikhindi, S. A. and Kumar, A. and Arora, A.	COVID-19 in patients with inflammatory bowel disease	2020	Insufficient original data
Anwar, M. M.	Immunotherapies and COVID-19 related Neurological manifestations: A Comprehensive Review Article	2020	Wrong population
Arazi, H. and Falahati, A. and Suzuki, K.	Moderate Intensity Aerobic Exercise Potential Favorable Effect Against COVID-19: The Role of Renin-Angiotensin System and Immunomodulatory Effects	2021	Wrong outcome
Artigas, C. and Lemort, M. and Mestrez, F. and Gil, T. and Flamen, P.	COVID-19 Pneumonia Mimicking Immunotherapy-Induced Pneumonitis on 18F-FDG PET/CT in a Patient Under Treatment With Nivolumab	2020	Incorrect study design
Ashare, R. L. and Bernstein, S. L. and Schnoll, R. and Gross, R. and Catz, S. L. and Cioe, P. and Crothers, K. and Hitsman, B. and Marhefka, S. L. and McClure, J. B. and Pacek, L. R. and Vidrine, D. J. and Vilardaga, R. and Kaufman, A. and Edelman, E. J.	The United States National Cancer Institute's Coordinated Research Effort on Tobacco Use as a Major Cause of Morbidity and Mortality among People with HIV	2021	Wrong population
Athale, J. and Gallagher, J. and Busch, L. M.	Management of Severe and Critical COVID-19 Infection with Immunotherapies	2022	Wrong population
Azoulay, Elie and Fartoukh, Muriel and Darmon, Michael and Geri, Guillaume and Voiriot, Guillaume and Dupont, Thibault and Zafrani, Lara and Girodias, Lola and Labbe, Vincent and Dres, Martin	Increased mortality in patients with severe SARS-CoV-2 infection admitted within seven days of disease onset	2020	Wrong population
Bacca, E. and Digaetano, M. and Meschiari, M. and Franceschini, E. and Menozzi, M. and Cuomo, G. and Mussini, C.	Immunomodulation for the management of severe SARS-CoV2 infections. State of the art and review of the literature	2021	Immunosuppressio n as treatment
Bachanas, P. J. and Chun, H. M. and Mehta, N. and Aberle-Grasse, J. and Parris, K. and Sherlock, M. W. and Lloyd, S. and Zeh, C. and Makwepa, D. K. and Kap and a, M. L. and Dokubo, E. K. and Bonono, L. and Balach and ra, S. and Ehui, E. and Fonjungo, P. and Nkoso, A. M. and Mazibuko, S. and Okello, V. N. and Tefera, F. and Getachew, M. and Katiku, E. M. and Mulwa, A. and Asiimwe, F. M. and Tarumbiswa, T. F. and Auld, A. F. and Nyirenda, R. and Dos Santos De Louvado, A. P. and Gaspar, I. and Hong, S. Y. and Ashipala, L. and	Protecting the gains: analysis of HIV treatment and service delivery programme data and interventions implemented in 19 African countries during COVID-19	2022	Wrong outcome

Obanubi, C. and Ikpeazu, A. and Musoni, C. and Yoboka, E. and Mthethwa, S. and Pinini, Z. and Bunga, S. and Rumunu, J. and Magesa, D. J. and Mutayoba, B. and Nelson, L. J. and Katureebe, C. and Agolory, S. and Mulenga, L. B. and Nyika, P. and Mugurungi, O. and Ellerbrock, T. and Mitruka, K.			
Bachar, S. C. and Mazumder, K. and Bachar, R. and Aktar, A. and Al Mahtab, M.	A Review of Medicinal Plants with Antiviral Activity Available in Bangladesh and Mechanistic Insight Into Their Bioactive Metabolites on SARS-CoV-2, HIV and HBV	2021	Wrong population
Badawy, A. A.	Immunotherapy of COVID-19 with poly (ADP-ribose) polymerase inhibitors: starting with nicotinamide	2020	Wrong population
Bagri, N. K. and Khan, M. and P and ey, R. M. and Lodha, R. and Kabra, S. K.	Initial Immunomodulation and Outcome of Children with Multisystem Inflammatory Syndrome Related to COVID-19: A Multisite Study from India	2022	Wrong population
Bakouny, Z. and Labaki, C. and Grover, P. and Awosika, J. and Gulati, S. and Hsu, C. Y. and Alimohamed, S. I. and Bashir, B. and Berg, S. and Bilen, M. A. and Bowles, D. and Castellano, C. and Desai, A. and Elkrief, A. and Eton, O. E. and Fecher, L. A. and Flora, D. and Galsky, M. D. and Gatti-Mays, M. E. and Gesenhues, A. and Glover, M. J. and Gopalakrishnan, D. and Gupta, S. and Halfdanarson, T. R. and Hayes-Lattin, B. and Hendawi, M. and Hsu, E. and Hwang, C. and J and arov, R. and Jani, C. and Johnson, D. B. and Joshi, M. and Khan, H. and Khan, S. A. and Knox, N. and Koshkin, V. S. and Kulkarni, A. A. and Kwon, D. H. and Matar, S. and McKay, R. R. and Mishra, S. and Moria, F. A. and Nizam, A. and Nock, N. L. and Nonato, T. K. and Panasci, J. and Pomerantz, L. and Portuguese, A. J. and Provenzano, D. and Puc, M. and Rao, Y. J. and Rhodes, T. D. and Riely, G. J. and Ripp, J. J. and Rivera, A. V. and Ruiz-Garcia, E. and Schmidt, A. L. and Schoenfeld, A. J. and Schwartz, G. K. and Shah, S. A. and Shaya, J. and Subbiah, S. and Tachiki, L. M. and Tucker, M. D. and Valdez-Reyes, M. and Weissmann, L. B. and Wotman, M. T. and Wulff-Burchfield, E. M. and Xie, Z. and Yang, Y. J. and Thompson, M. A. and Shah, D. P. and Warner, J. L. and Shyr, Y. and Choueiri, T. K. and Wise-Draper, T. M.	Interplay of Immunosuppression and Immunotherapy Among Patients With Cancer and COVID-19	2022	Wrong outcome
Banerjee, Amitava and Pasea, Laura and Harris, Steve and Gonzalez-Izquierdo, Arturo and Torralbo, Ana and Shallcross, Laura and Noursadeghi, Mahdad and Pillay, Deenan and Pagel, Christina and Wong, Wai Keong	Estimating excess 1-year mortality from COVID-19 according to underlying conditions and age in England: a rapid analysis using NHS health records in 3.8 million adults	2020	Wrong outcome
Banerjee, Amitava and Pasea, Laura and Harris, Steve and Gonzalez-Izquierdo, Arturo and Torralbo, Ana and Shallcross, Laura and Noursadeghi, Mahdad and Pillay, Deenan and Sebire, Neil and Holmes, Chris	Estimating excess 1-year mortality associated with the COVID-19 pandemic according to underlying conditions and age: a population-based cohort study	2020	Wrong outcome
Barat, M. and Duran, J. M. and Sung, K. and Brown, M. and Lin, A. Y. and King, K. R. and Adler, E. D. and Aslam, S.	Breakthrough Infections and Low Mortality Observed in Heart Transplant Recipients Infected with COVID-19 at UC San Diego	2022	n<50
Barrera-LÃ³pez, P. and PÃ©rez-Riveros, E. D. and Moreno-Montoya, J. and Ballesteros, S. M. and Valencia, S. A. and De la Hoz-Valle, J. A.	Coinfection of other respiratory pathogens and HIV in COVID-19 patients: Is there a pattern?	2021	Insufficient original data
Basic-Jukic, N. and Racki, S. and Tolj, I. and Aleckovic, M. and Babovic, B. and Juric, I. and Furic-Cunko, V. and Katalinic, L. and Mihaljevic, D. and Vujic, S. and Mesic, E. and Jelakovic, B. and Kastelan, Z.	Hospitalization and death after recovery from acute COVID-19 among renal transplant recipients	2022	Duplicate
Basu-Ray, I. and Metri, K. and Khanra, D. and Revankar, R. and Chinnaiyan, K. M. and Raghuram, N. and Mishra, M. C. and Patwardhan, B. and Sharma, M. and	A narrative review on yoga: a potential intervention for augmenting immunomodulation and mental health in COVID-19	2022	Wrong population

Basavaraddi, I. V. and An and , A. and Reddy, S. and Deepak, K. K. and Levy, M. and Theus, S. and Levine, G. N. and Cramer, H. and Fricchione, G. L. and Hongas and ra, N. R.			
BatÃ±rel, A. and Demirhan, R. and Eser, N. and KÃ¶rlÃ¼, E. and Tezcan, M. E.	Pulse steroid treatment for hospitalized adults with COVID-19	2021	Incorrect study design
Bazgir, N. and Taghinezhad, F. and Nourmohammadi, H. and Azami, G. and Ahmadi, I. and Mozafari, A.	Comparing the COVID-19 Mortality Rate in Cancer Patients with and Without a History of Chemotherapy	2022	Single centre
Beaney, Thomas and Clarke, Jonathan M and Jain, Vageesh and Golestaneh, Amelia Kataria and Lyons, Gemma and Salman, David and Majeed, Azeem	Excess mortality: the gold standard in measuring the impact of COVID-19 worldwide?	2020	Insufficient original data
Bell, D. and Schultz Hansen, K.	Relative Burdens of the COVID-19, Malaria, Tuberculosis, and HIV/AIDS Epidemics in Sub-Saharan Africa	2021	Wrong population
Bell, N. and Bracchi, M. and Dalla Pria, A. and Nelson, M. and Boffito, M.	Indirect Human Immunodeficiency Virus Morbidity and Mortality Due to Coronavirus Disease 2019	2021	Wrong outcome
Bell, N. and Longley, J. and Falconer, J. and Sutcliffe, L. and Dalla Pria, A. and Garvey, L. and Nelson, M. and Boffito, M. and Bracchi, M.	The indirect effects of COVID-19 on the morbidity and mortality of people living with HIV	2021	Single centre
Bell, Samira and Campbell, Jacqueline and McDonald, Jackie and Oâ€™Neill, Martin and Watters, Chrissie and Buck, Katharine and Cousl and , Zoe and Findlay, Mark and Lone, Nazir I and Metcalfe, Wendy	COVID-19 in patients undergoing chronic kidney replacement therapy and kidney transplant recipients in Scotland: findings and experience from the Scottish renal registry	2020	n<50
Belluomini, L. and Caldart, A. and Avancini, A. and Dodi, A. and Trestini, I. and Kadrija, D. and Sposito, M. and Tregnago, D. and Casali, M. and Riva, S. T. and Sartori, G. and Menis, J. and Milella, M. and Pilotto, S.	Infections and Immunotherapy in Lung Cancer: A Bad Relationship?	2020	Incorrect study design
Belsky, Jennifer A and Tullius, Brian P and Lamb, Margaret G and Sayegh, Rouba and Stanek, Joseph R and Auletta, Jeffery J	COVID-19 in immunocompromised patients: a systematic review of cancer, hematopoietic cell and solid organ transplant patients	2021	Paediatric data
Ben Moftah, M. and Eswayah, A.	Repurposing of Hydroxyurea Against COVID-19: A Promising Immunomodulatory Role	2022	Wrong population
Benade, M. and Long, L. and Rosen, S. and Meyer-Rath, G. and Tucker, J. M. and Miot, J.	Reduction in initiations of HIV treatment in South Africa during the COVID pandemic	2022	Indirect mortality
Benchimol, E. I. and Carroll, M. W. and Geist, R. and Griffiths, A. M. and Huang, J. G. and Mack, D. R. and Bernstein, C. N. and Bitton, A. and Jones, J. L. and Kaplan, G. G. and Kuenzig, M. E. and Lee, K. and Mukhtar, M. S. and Murthy, S. K. and T and on, P. and Targownik, L. E. and Windsor, J. W. and Seow, C. H.	Crohn's and Colitis Canada's 2021 Impact of COVID-19 and Inflammatory Bowel Disease in Canada: Children and Expectant Mothers With Inflammatory Bowel Disease	2021	Wrong population
Benotmane, I. and Perrin, P. and Gautier Vargas, G. and Bass and , X. and Keller, N. and Lavaux, T. and Ohana, M. and Bedo, D. and Baldacini, C. and Sagnard, M. and Bozman, D. F. and Della Chiesa, M. and Cognard, N. and Olagne, J. and Delagreverie, H. and Marx, D. and Heibel, F. and Braun, L. and Moulin, B. and Fafi Kremer, S. and Caillard, S.	Biomarkers of Cytokine Release Syndrome Predict Disease Severity and Mortality From COVID-19 in Kidney Transplant Recipients	2020	n<50
Berger, B. and Hazzan, M. and Kamar, N. and Francois, H. and Matignon, M. and Greze, C. and Gatault, P. and Frimat, L. and Westeel, P. F. and Goutaudier, V. and Snanoudj, R. and Colosio, C. and Sicard, A. and Bertr and , D. and Mousson, C. and Bamoulid, J. and Thierry, A. and Anglicheau, D. and Couzi, L. and Chemouny, J. M. and Duveau, A. and Moal, V. and Le Meur, Y. and Blancho, G. and Tourret, J. and Malvezzi, P. and Mariat, C. and Rerolle, J. P. and Bouvier, N. and Caillard, S. and Thaunat, O.	Changing of therapeutic trends between the 1st and 2nd wave did not reduce COVID-19 related mortality of renal transplant recipients: A national registry study	2021	Duplicate
Bernini, R. and Velotti, F.	Natural Polyphenols as Immunomodulators to Rescue Immune Response Homeostasis: Quercetin as a Research Model against Severe COVID-19	2021	Immunosuppression as treatment

Bernstein, C. N. and Singh, H. and Murthy, S. K. and Nguyen, G. C. and Benchimol, E. I. and Bitton, A. and Kuenzig, M. E. and Huang, J. G. and Jones, J. L. and Lee, K. and Targownik, L. E. and Windsor, J. W. and Mukhtar, M. S. and T and on, P. and Kaplan, G. G.	Crohn's and Colitis Canada's 2021 Impact of COVID-19 and Inflammatory Bowel Disease in Canada: Seniors With IBD	2021	Duplicate
Bertini, Christopher D and Khawaja, Fareed and Sheshadri, Ajay	COVID-19 in the Immunocompromised Host	2022	Duplicate
Bhargava, Ashish and Szpunar, Susanna M and Sharma, Mamta and Fukushima, Elisa Akagi and Hoshi, Sami and Levine, Miriam and G and hi, Nikhil and Zhao, Wei and Michael, Somero and Tanveer, Farah	Clinical features and risk factors for in-hospital mortality from COVID-19 infection at a tertiary care medical center, at the onset of the US COVID-19 pandemic	2021	Wrong outcome
Bhatti, A. B. H. and Riyaz, S. and Akhtar, A.	In-hospital Mortality after Liver Transplantation due to COVID-19	2020	Incorrect study design
BobircÄƒ, A. and BobircÄƒ, F. and AncuÈ›a, I. and Florescu, A. and BojincÄƒ, M. and MuscÄƒ, A. and Florescu, D. N. and Florescu, L. M. and Sima, R. M. and Florescu, A. and MuÈ™etescu, A. E.	COVID-19-A Trigger Factor for Severe Immune-Mediated Thrombocytopenia in Active Rheumatoid Arthritis	2022	Wrong outcome
Boffito, Marta and Waters, Laura	More evidence for worse COVID-19 outcomes in people with HIV	2021	Insufficient original data
Bongomin, F. and Sereke, S. G. and Okot, J. and Katsigazi, R. and K and ole, T. K. and Oriekot, A. and Olum, R. and Atukunda, A. and Baluku, J. B. and Nakwagala, F.	COVID-19, HIV-Associated Cryptococcal Meningitis, Disseminated Tuberculosis and Acute Ischaemic Stroke: A Fatal Foursome	2021	Incorrect study design
Bonuomo, V. and Ferrarini, I. and Dell'Eva, M. and SbisÃ , E. and Krampera, M. and Visco, C.	COVID-19 (SARS-CoV-2 infection) in lymphoma patients: A review	2021	Incorrect study design
Booton, R. D. and Fu, G. and MacGregor, L. and Li, J. and Ong, J. J. and Tucker, J. D. and Turner, K. M. and Tang, W. and Vickerman, P. and Mitchell, K. M.	The impact of disruptions due to COVID-19 on HIV transmission and control among men who have sex with men in China	2021	Wrong outcome
Booton, R. D. and Fu, G. and MacGregor, L. and Li, J. and Ong, J. J. and Tucker, J. D. and Turner, K. M. E. and Tang, W. and Vickerman, P. and Mitchell, K. M.	Estimating the impact of disruptions due to COVID-19 on HIV transmission and control among men who have sex with men in China	2020	Wrong outcome
Boppana, T. K. and Mittal, S. and Madan, K. and Mohan, A. and Hadda, V. and Tiwari, P. and Guleria, R.	Steroid therapy for COVID-19: A systematic review and meta-analysis of randomized controlled trials	2021	Wrong population
Borin, A. and Coimbra, L. D. and Bispo-Dos-Santos, K. and Naciuk, F. F. and Fontoura, M. and Simeoni, C. L. and Gomes, G. V. and Amorim, M. R. and Gravina, H. D. and Shimizu, J. F. and Passos, A. S. C. and de Oliveira, I. M. and de Carvalho, A. C. and Cardoso, A. C. and Parise, P. L. and Toledo-Teixeira, D. A. and Sotorilli, G. E. and Persinoti, G. F. and Claro, I. M. and Sabino, E. C. and Alborghetti, M. R. and Rocco, S. A. and Franchini, K. G. and de Souza, W. M. and Oliveira, P. S. L. and Cunha, T. M. and Granja, F. and ProenÃ§a-MÃ³dena, J. L. and Trivella, D. B. B. and Bruder, M. and Cordeiro, A. T. and Marques, R. E.	Identification and characterization of the anti-SARS-CoV-2 activity of cationic amphiphilic steroidal compounds	2022	Wrong outcome
Borshoff, D. C. and Sadleir, P.	Nonoperating room anaesthesia: safety, monitoring, cognitive aids and severe acute respiratory syndrome coronavirus 2	2020	Wrong outcome
Bosworth, Matthew L and Ayoubkhani, Daniel and Nafilyan, VahÃ© and Foubert, Josephine and Glickman, Myer and Davey, Calum and Kuper, Hannah	Deaths involving COVID-19 by disability status: a retrospective analysis of 29 million adults during the first two waves of the Coronavirus pandemic in England	2021	Wrong population
Bouleftour, W. and Bonjean, P. and Grangeon, K. and MagnÃ©, N.	COVID-19 Vaccine-Related Adverse Events in Solid Cancer Patients Treated with Immunotherapy	2022	Wrong population
Brannigan, L and Botha, J	An argument for a rational and balanced risk approach to transplantation during the COVID-19 pandemic	2020	Insufficient original data
Brown, A. E. and Croxford, S. E. and Nash, S. and Khawam, J. and Kirwan, P. and Kall, M. and Bradshaw, D. and Sabin, C. and Miller, R. F. and	COVID-19 mortality among people with diagnosed HIV compared to	2022	Single centre

Post, F. A. and Harding, R. and Collins, S. and Waters, L. and Asboe, D. and Chadwick, D. R. and Delpech, V. and Sullivan, A. K.	those without during the first wave of the COVID-19 pandemic in England		
Brown, L. B. and Spinelli, M. A. and G and hi, M.	The interplay between HIV and COVID-19: summary of the data and responses to date	2021	Insufficient original data
Brownstone, N. D. and Thibodeaux, Q. G. and Reddy, V. D. and Myers, B. A. and Chan, S. Y. and Bhutani, T. and Liao, W.	Novel Coronavirus Disease (COVID-19) and Biologic Therapy in Psoriasis: Infection Risk and Patient Counseling in Uncertain Times	2020	Wrong outcome
Bruce, E. and Barlow-Pay, F. and Short, R. and Vilches-Moraga, A. and Price, A. and McGovern, A. and Braude, P. and Stechman, M. J. and Moug, S. and McCarthy, K. and Hewitt, J. and Carter, B. and Myint, P. K.	Prior Routine Use of Non-Steroidal Anti-Inflammatory Drugs (NSAIDs) and Important Outcomes in Hospitalised Patients with COVID-19	2020	Wrong population
Bsteh, G. and Assar, H. and Hegen, H. and Heschl, B. and Leutmezer, F. and Di Pauli, F. and Gradl, C. and Traxler, G. and Zulehner, G. and Rommer, P. and Wipfler, P. and Guger, M. and Enzinger, C. and Berger, T.	COVID-19 severity and mortality in multiple sclerosis are not associated with immunotherapy: Insights from a nation-wide Austrian registry	2021	Wrong outcome
Buchbinder, S. and Liu, A.	CROI 2021: Epidemiologic Trends in the HIV and SARS-CoV-2 Pandemics and HIV Prevention Research	2021	Wrong outcome
Bukhari, M.	A deeper dive into rare autoimmune diseases, death and COVID-19 in the first wave of the pandemic	2021	Incorrect study design
Bulbuloglu, S. and Kapikiran, G.	The effect of immunosuppressive therapy after liver transplantation on activities of daily living and fear of death during the COVID-19 pandemic	2021	Wrong outcome
Bulut, Ã– and GÃœrsel, Ä°	Mesenchymal stem cell derived extracellular vesicles: promising immunomodulators against autoimmune, autoinflammatory disorders and SARS-CoV-2 infection	2020	Wrong population
Burns, S. M. and Woodworth, T. S. and Icten, Z. and Honda, T. and Manjourides, J.	A Machine Learning Approach to Identify Predictors of Severe COVID-19 Outcome in Patients With Rheumatoid Arthritis	2022	Wrong outcome
Calis, H. and Karabulut, Z. and Guler, Y. and Sengul, S.	Idiopathic granulomatous mastitis and steroid use during the pandemic of COVID-19	2022	Wrong outcome
Camargo, Jose F and Mendoza, Maria A and Lin, Rick and Moroz, Ilona V and Anderson, Anthony D and Morris, Michelle I and Natori, Yoichiro and Natori, Akina and Raja, Mohammed and Lekakis, Lazaros	Clinical presentation and outcomes of COVID-19 following hematopoietic cell transplantation and cellular therapy	2021	Single centre
Campbell, H. M. and Murata, A. E. and Conner, T. A. and Fotieo, G.	Chronic use of non-steroidal anti-inflammatory drugs (NSAIDs) or acetaminophen and relationship with mortality among United States Veterans after testing positive for COVID-19	2022	Wrong population
Cantarelli, Chiara and Angeletti, Andrea and Perin, Laura and Russo, Luis Sanchez and Sabiu, Gianmarco and PodestÃ , Manuel Alfredo and Cravedi, Paolo	Immune responses to SARS-CoV-2 in dialysis and kidney transplantation	2022	Wrong outcome
Cassin, R. and Rampi, N. and C, F. and Muscatello, A. and Mariani, B. and Noto, A. and Rossi, F. G. and Baldini, L.	Reply to "successful early use of anti-SARS-CoV-2 monoclonal neutralizing antibodies in SARS-CoV-2 infected hematological patients-A Czech multicenter experience": A case series of SARS-CoV-2 Omicron infection and aggressive lymphoma in the Sotrovimab era	2022	Incorrect study design
Ceballos, M. E. and Ross, P. and Lasso, M. and Dominguez, I. and Puente, M. and Valenzuela, P. and Enberg, M. and Serri, M. and MuÃ±oz, R. and Pinos, Y. and Silva, M. and Noguera, M. and Dominguez, A. and Zamora, F.	Clinical characteristics and outcomes of people living with HIV hospitalized with COVID-19: a nationwide experience	2021	n<50

Cesaro, S. and Ljungman, P. and Mikulska, M. and Hirsch, H. H. and von Lilienfeld-Toal, M. and Cordonnier, C. and Meylan, S. and Mehra, V. and Styczynski, J. and Marchesi, F. and Besson, C. and Baldanti, F. and Masculano, R. C. and Beutel, G. and Einsele, H. and Azoulay, E. and Maertens, J. and de la Camara, R. and Pagano, L.	Recommendations for the management of COVID-19 in patients with haematological malignancies or haematopoietic cell transplantation, from the 2021 European Conference on Infections in Leukaemia (ECIL 9)	2022	Insufficient original data
Ch and a, D. and Minchella, P. A. and Kampamba, D. and Itoh, M. and Hines, J. Z. and Fwoloshi, S. and Boyd, M. A. and Hamusonde, K. and Chirwa, L. and Nikoi, K. and Chirwa, R. and Siwingwa, M. and Sivile, S. and Zyambo, K. D. and Mweemba, A. and Mbewe, N. and Mutengo, K. H. and Malama, K. and Agolory, S. and Mulenga, L. B.	COVID-19 Severity and COVID-19-Associated Deaths Among Hospitalized Patients with HIV Infection - Zambia, March-December 2020	2021	Paediatric data
Chakravarthy, K. and Str and , N. and Frosch, A. and Sayed, D. and Narra, L. R. and Chaturvedi, R. and Grewal, P. K. and Pope, J. and Schatman, M. E. and Deer, T.	Recommendations and Guidance for Steroid Injection Therapy and COVID-19 Vaccine Administration from the American Society of Pain and Neuroscience (ASPN)	2021	Insufficient original data
Chambers, C. and Samji, H. and Cooper, C. L. and Costiniuk, C. T. and Janjua, N. Z. and Kroch, A. E. and Arbess, G. and Benoit, A. C. and Buchan, S. A. and Chung, H. and Kendall, C. E. and Kwong, J. C. and Langlois, M. A. and Lee, S. M. and Mbuagbaw, L. and McCullagh, J. and Moineddin, R. and Nambiar, D. and Walmsley, S. and Anis, A. H. and Burchell, A. N.	Coronavirus disease 2019 vaccine effectiveness among a population-based cohort of people living with HIV	2022	Wrong outcome
Chastain, D. B. and Stitt, T. M. and Ly, P. T. and Henao-MartÃnez, A. F. and Franco-Paredes, C. and Osae, S. P.	Countermeasures to Coronavirus Disease 2019: Are Immunomodulators Rational Treatment Options-A Critical Review of the Evidence	2020	Wrong population
Chatterjee, K. and Wu, C. P. and Bhardwaj, A. and Siuba, M.	Steroids in COVID-19: An overview	2020	Wrong population
Chedid, Georges and Abdessamad, Hilal and Costanian, Christy and Maamari, Julian and Al Nakib, Mostafa and Maatook, Ismael and Farra, Anna and Hussni, Roula and Mokhbat, Jacques	COVID-19 in Persons Living With HIV: A Cross-Sectional Study From Lebanon	2020	Insufficient original data
Chen, L. and Hu, K. and Cheng, C. and Hu, Q. and Zhang, L. and An, T. and Guo, Y. and Chen, S. and Duan, G.	Risk of adverse outcomes in inflammatory bowel disease patients infected with SARS-CoV-2: a systematic review and meta-analysis	2022	Paediatric data
Chen, X. and Guo, H. and Qiu, L. and Zhang, C. and Deng, Q. and Leng, Q.	Immunomodulatory and Antiviral Activity of Metformin and Its Potential Implications in Treating Coronavirus Disease 2019 and Lung Injury	2020	Wrong population
Cheng, J. and Tao, J. and Li, B. and Shi, Y. and Liu, H.	Coinfection with PEDV and BVDV induces inflammatory bowel disease pathway highly enriched in PK-15 cells	2022	Wrong population
Chenneville, T. and Gabbidon, K. and Hanson, P. and Holyfield, C.	The Impact of COVID-19 on HIV Treatment and Research: A Call to Action	2020	Insufficient original data
Chiappelli, F. and Khakshooy, A. and Greenberg, G.	CoViD-19 Immunopathology and Immunotherapy	2020	Insufficient original data
Chilot, D. and Woldeamanuel, Y. and Manyazewal, T.	COVID-19 Burden on HIV Patients Attending Antiretroviral Therapy in Addis Ababa, Ethiopia: A Multicenter Cross-Sectional Study	2022	Wrong outcome
Choudhary, D. and Kenwar, D. and Sharma, A. and Bhalla, A. and Singh, S. and Singh, M. P. and Kumar, V. and Sharma, A.	Risk factors for mortality in kidney transplant recipients with COVID-19: a single centre experience and case-control study	2022	Single centre
Choudhury, A. and Mukherjee, G. and Mukherjee, S.	Chemotherapy vs. Immunotherapy in combating nCOVID19: An update	2021	Wrong population
Christie, M. J. and Irving, A. T. and Forster, S. C. and Marsl and , B. J. and Hansbro, P. M. and Hertzog, P. J. and Nold-Petry, C. A. and Nold, M. F.	Of bats and men: Immunomodulatory treatment options for COVID-19 guided by the immunopathology of SARS-CoV-2 infection	2021	Wrong population

Chun, H. M. and Milligan, K. and Agyemang, E. and Ford, N. and Rangaraj, A. and Desai, S. and Wilder-Smith, A. and Vitoria, M. and Zulu, I.	A Systematic Review of COVID-19 Vaccine Antibody Responses in People With HIV	2022	Wrong outcome
Clarke, J. A. and Wiemken, T. L. and Korenblat, K. M.	Excess Mortality Among Solid Organ Transplant Recipients in the United States During the COVID-19 Pandemic	2022	Wrong outcome
Coll, Elisabeth and FernÃ¡ndezâ€□Ruiz, Mario and SÃ¡nchezâ€□Ã□lvarez, J Emilio and MartÃ-nezâ€□FernÃ¡ndez, JosÃ© R and Crespo, Marta and Gayoso, Jorge and Badaâ€□Bosch, Teresa and Oppenheimer, Federico and Moreso, Francesc and LÃ³pezâ€□Oliva, MarÃa O	COVID-19 in transplant recipients: the Spanish experience	2021	Paediatric data
Collaboration, Antiretroviral Therapy Cohort	Mortality of HIV-infected patients starting potent antiretroviral therapy: comparison with the general population in nine industrialized countries	2009	Wrong outcome
Collora, J. A. and Liu, R. and Albrecht, K. and Ho, Y. C.	The single-cell landscape of immunological responses of CD4+ T cells in HIV versus severe acute respiratory syndrome coronavirus 2	2021	Wrong population
Conforti, Claudio and Giuffrida, Roberta and Di Meo, Nicola and Zalaudek, Iris	Management of advanced melanoma in the COVID-19 era	2020	Insufficient original data
Conforti, Claudio and Giuffrida, Roberta and Dianzani, Caterina and Di Meo, Nicola and Zalaudek, Iris	Biologic therapy for psoriasis during the COVID-19 outbreak: the choice is to weigh risks and benefits	2020	Insufficient original data
Conforti, Claudio and Giuffrida, Roberta and Dianzani, Caterina and Di Meo, Nicola and Zalaudek, Iris	COVID-19 and psoriasis: is it time to limit treatment with immunosuppressants? A call for action	2020	Insufficient original data
Constans, M. and Santiago, R. and Jimenez, L. and Motllo, C. and Lopez, R. and Trape, J. and Reverter, J. C. and Altes, A.	Lupus anticoagulant is an independent risk factor for non-thrombotic in-hospital mortality in COVID-19 patients	2021	Wrong population
Conway, Richard and Grimshaw, Alyssa A and Konig, Maximilian F and Putman, Michael and Duarteâ€□GarcÃa, AlÃ and Tseng, Leslie Yingzhijie and Cabrera, Diego M and Chock, Yu Pei Eugenia and Degirmenci, Huseyin Berk and Duff, Eimear	SARSâ€“CoVâ€□2 Infection and COVID-19 Outcomes in Rheumatic Diseases: A Systematic Literature Review and Metaâ€□Analysis	2022	Paediatric data
Copertino, D. C., Jr. and Casado Lima, B. C. and Duarte, R. R. R. and Powell, T. R. and Ormsby, C. E. and Wilkin, T. and Gulick, R. M. and de Mulder Rougvie, M. and Nixon, D. F.	Antiretroviral drug activity and potential for pre-exposure prophylaxis against COVID-19 and HIV infection	2022	Wrong outcome
Cordtz, RenÃ© and Lindhardsen, Jesper and Soussi, Bolette G and Vela, Jonathan and Uhrenholt, Line and Westermann, Rasmus and Kristensen, Salome and Nielsen, Henrik and Torp-Pedersen, Christian and Dreyer, Lene	Incidence and severeness of COVID-19 hospitalization in patients with inflammatory rheumatic disease: a nationwide cohort study from Denmark	2021	n<50
Couzin-Frankel, J.	Will COVID-19 change science? Past pandemics offer clues from the Black Death to AIDS, outbreaks can spur scientists to rethink how they study disease and protect public health	2021	Wrong outcome
Creemers, R. H. and Rezazadeh Ardabili, A. and Jonkers, D. M. and Leers, M. P. G. and Romberg-Camps, M. J. and Pierik, M. J. and van Bodegraven, A. A.	Severe COVID-19 in inflammatory bowel disease patients in a population-based setting	2021	n<50
Croxford, S. and Brown, A. and Nash, S. and Khawam, J. and Kall, M. and Bradshaw, D. and Sabin, C. and Miller, R. and Post, F. and Harding, R. and Lucas, S. and Collins, S. and Waters, L. and Asboe, D. and Chadwick, D. and Delpech, V. and Sullivan, A.	COVID-19 mortality among people with HIV compared to the general population during the first wave of the epidemic in England	2021	Wrong outcome
Cutolo, M. and Smith, V. and Paolino, S.	Editorial: Understanding immune effects of oestrogens to explain the reduced morbidity and mortality in female versus male COVID-19 patients. Comparisons with autoimmunity and vaccination	2020	Wrong outcome
Dâ€™Souza, Gypsyamber and Springer, Gayle and Gustafson, Deborah and Kassaye, Seble	COVID-19 symptoms and SARS-CoV-2 infection among people living	2020	Wrong outcome

and Alcaide, Maria L and Ramirez, Catalina and Sharma, Anjali and Palella, Frank J and Tien, Phyllis C and Detels, Roger	with HIV in the US: the MACS/WIHS combined cohort study		
DÃez, C. and Del Romero-Raposo, J. and Mican, R. and LÃ³pez, J. C. and Blanco, J. R. and Calzado, S. and Samperiz, G. and Portilla, J. and GarcÃa-Fraile, L. J. and GutiÃ©rrez, F. and GÃ³mez-Sirvent, J. L. and SuÃ¡rez-GarcÃa, I. and Amador, C. and Novella, M. and Arribas, J. R. and Moreno, S. and GonzÃ¡lez-GarcÃa, J. and JarrÃn, I. and Berenguer, J.	COVID-19 in hospitalized HIV-positive and HIV-negative patients: A matched study	2021	n<50
Dahmane, R. and Sahtout, W. and Azzabi, A. and Thabet, N. and Hadhri, A. and kallel, W. and ben aicha, N. and Mrabet, S. and Fradi, A. and boukadida, R. and Zellama, D. and fodha, I. and trabelsi, A. and Guedri, Y. and Achour, A.	Pos-789 Death in Kidney Transplant Recipients with Covid-19 Experience of Nephrology Department of Sahloul Hospital	2022	n<50
Danwang, C. and Noubiap, J. J. and Robert, A. and Yombi, J. C.	Outcomes of patients with HIV and COVID-19 co-infection: a systematic review and meta-analysis	2022	Paediatric data
Danzigerâ€□Isakov, Lara and Blumberg, Emily A and Manuel, Oriol and Sester, Martina	Impact of COVID-19 in solid organ transplant recipients	2021	Incorrect study design
Das, S. and Rastogi, A. and Harikumar, K. V. S. and Dutta, D. and Sahay, R. and Kalra, S. and Ghosh, S. and Gupta, S. K. and P and it, K. and Jabbar, P. K. and Damodaran, S. and Nagesh, V. S. and Sheikh, S. and Madhu, S. V. and Bantwal, G.	Diagnosis and Management Considerations in Steroid-Related Hyperglycemia in COVID-19: A Position Statement from the Endocrine Society of India	2021	Incorrect study design
Davidson, Jennifer and Warren-Gash, Charlotte and Mcdonald, Helen and Banerjee, Ami and Gayle, Alicia and Strongman, Helen and Evans, Dai and Clay, Simon and Forbes, Harriet and Mansfield, Kathryn E	Codelists for:" Factors associated with excess mortality in the first wave of COVID-19 pandemic in the UK: a cohort analysis using the Clinical Practice Research Databank"	2021	Incorrect study design
De Brab and er, J. and Duijvelaar, E. and Schippers, J. R. and Smeele, P. J. and Duitman, J. and Aman, J. and Bogaard, H. J. and Van Der Poll, T. and Bos, L. D. J.	Oral Imatinib Reduces Mortality in Hospitalized COVID-19 Patients Through Endothelial Barrier Protection and Immunomodulation	2022	Wrong population
de Brab and er, J. and Duijvelaar, E. and Schippers, J. R. and Smeele, P. J. and Peters-Sengers, H. and Duitman, J. W. and Aman, J. and Bogaard, H. J. and van der Poll, T. and Bos, L. D. J.	Immunomodulation and endothelial barrier protection mediate the association between oral imatinib and mortality in hospitalised COVID-19 patients	2022	Wrong population
de Lazzari, E. and MartÃnez-Mimbrero, A. and Chivite, I. and GonzÃ¡lez-CordÃ³n, A. and Mosquera, M. M. and Laguno, M. and Costa, J. and Bosch, J. and Blanco, J. L. and Ã□lvarez-Martinez, M. and Ugarte, A. and Inciarte, A. and de la Mora, L. and Torres, B. and MartÃnez-Rebollar, M. and Ambrosioni, J. and FernaÃ¡ndez, E. and Hurtado, J. C. and Mallolas, J. and MirÃ³, J. M. and Marcos, M. A. and MartÃnez, E.	Impact of coronavirus disease 2019 epidemics on prevention and care for HIV and other sexually transmitted infections	2022	Wrong outcome
De Lima-Karagiannis, A. and Juillerat, P. and Sebastian, S. and Pedersen, N. and Bar-Gil Shitrit, A. and van der Woude, C. J.	Management of Pregnant Inflammatory Bowel Disease Patients During the COVID-19 Pandemic	2020	Wrong population
De Meester, Johan and De Bacquer, Dirk and Naesens, Maarten and Meijers, Bjorn and Couttenye, Marie M and De Vriese, An S	Incidence, characteristics, and outcome of COVID-19 in adults on kidney replacement therapy: a regionwide registry study	2021	Wrong outcome
De Sirkar, S. and Yu, M.	Predictors of all-cause mortality in heart transplant recipients with covid-19	2021	n<50
De Waard, L. and Langenegger, E. and Erasmus, K. and Van der Merwe, T. and Olivier, S. E. and Du Toit, N. and Paulsen, C. and Nkangana, N. and Van Niekerk, M. and Moodley, A. and Schell, S. and Taljaard, J. and Botha, M. H. and Dramowski, A. and Cluver, C. A. and Bekker, A.	Maternal and neonatal outcomes of COVID-19 in a high-risk pregnant cohort with and without HIV	2021	Wrong population
Dejani, N. N. and Elshabrawy, H. A. and Bezerra Filho, Cdsm and de Sousa, D. P.	Anticoronavirus and Immunomodulatory Phenolic Compounds: Opportunities and Pharmacotherapeutic Perspectives	2021	Wrong outcome

Della Pia, A. and Zhao, C. and J and ir, P. and Gupta, A. and Batistick, M. and Kim, G. Y. G. and Xia, Y. and Ahn, J. and Magarelli, G. and Lukasik, B. and Leslie, L. A. and Goy, A. H. and Ip, A. and Feldman, T. A.	Improved Survival of Lymphoma Patients with COVID-19 in the Modern Treatment and Vaccination Era	2022	Single centre
Dell'Edera, A. and Borghesan, F. and Favero, E. and Rattazzi, M. and Scarpa, R. and Tartaglia, L. and Agostini, C. and Cinetto, F.	Venom immunotherapy during COVID-19 pandemic: Experience from a University Allergy Center in Northern Italy	2020	Wrong population
Deputy, M. and Sahnan, K. and Worley, G. and Patel, K. and Balinskaite, V. and Bottle, A. and Aylin, P. and Burns, E. M. and Hart, A. and Faiz, O.	The use of, and outcomes for, inflammatory bowel disease services during the Covid-19 pandemic: a nationwide observational study	2022	Wrong population
Devresse, Arnaud and De Greef, Julien and Yombi, Jean Cyr and Belkhir, Leila and Goffin, Eric and Kanaan, Nada	Immunosuppression and SARS-CoV-2 infection in kidney transplant recipients	2022	Incorrect study design
Dh and , Abhay and Razonable, Raymund R	COVID-19 and solid organ transplantation: role of anti-SARS-CoV-2 monoclonal antibodies	2022	Incorrect study design
DomÃnguez-Rojas, J. A. and Rojas-Soto, N. and VÃ¡squez-Hoyos, P. and Coronado Munoz, A. J.	Difficult acute lymphoblastic leukaemia diagnosis in a paediatric patient with mixed presentation of COVID-19 acute respiratory failure and multisystemic inflammatory syndrome	2022	n<50
Domjanovic, J. and Matetic, A. and Bakovic Kramaric, D. and Domjanovic Skopinic, T. and Boric Skaro, D. and Delic, N. and Runjic, F. and Jelicic, I.	Association of the novel CROW-65 risk score and mortality in hospitalized kidney transplant recipients with COVID-19 : A retrospective observational study	2022	n<50
Dong, Y. and Li, Z. and Ding, S. and Liu, S. and Tang, Z. and Jia, L. and Liu, J. and Liu, Y.	HIV infection and risk of COVID-19 mortality: A meta-analysis	2021	Paediatric data
Dowd, J. B. and Andriano, L. and Brazel, D. M. and Rotondi, V. and Block, P. and Ding, X. and Liu, Y. and Mills, M. C.	Demographic science aids in understanding the spread and fatality rates of COVID-19	2020	Wrong population
Drake, T. M. and Fairfield, C. J. and Pius, R. and Knight, S. R. and Norman, L. and Girvan, M. and Hardwick, H. E. and Docherty, A. B. and Thwaites, R. S. and Openshaw, P. J. M. and Baillie, J. K. and Harrison, E. M. and Semple, M. G.	Non-steroidal anti-inflammatory drug use and outcomes of COVID-19 in the ISARIC Clinical Characterisation Protocol UK cohort: a matched, prospective cohort study	2021	Wrong population
Dravid, A. and Kashiva, R. and Khan, Z. and Memon, D. and Kodre, A. and Potdar, P. and Mane, M. and Borse, R. and Pawar, V. and Patil, D. and Banerjee, D. and Bhoite, K. and Phar and e, R. and Kalyani, S. and Raut, P. and Bapte, M. and Mehta, A. and Reddy, M. S. and Bhayani, K. and Laxmi, S. S. and Vishnu, P. D. and Srivastava, S. and Kh and elwal, S. and More, S. and Shinde, R. and Pawar, M. and Harshe, A. and Kadam, S. and Mahajan, U. and Joshi, G. and Mane, D.	Combination therapy of Tocilizumab and steroid for management of COVID-19 associated cytokine release syndrome: A single center experience from Pune, Western India	2021	Wrong population
D'Silva, K. M. and Wallace, Z. S.	COVID-19 and rheumatoid arthritis	2021	Incorrect study design
Duran, J. M. and Barat, M. and Lin, A. Y. and King, K. R. and Greenberg, B. and Adler, E. D. and Aslam, S.	Low mortality in SARS-CoV-2 infected heart transplant recipients at a single center	2022	n<50
Durstenfeld, M. S. and Sun, K. and Ma, Y. and Rodriguez, F. and Secemsky, E. A. and Parikh, R. V. and Hsue, P. Y.	Association of HIV infection with outcomes among adults hospitalized with COVID-19	2022	Wrong outcome
Dutschke, A. and Wejse, C. and Nanque, J. P. and Medina, C. and HÃ¸nge, B. L. and Jespersen, S.	SARS-CoV-2 seroprevalence among people living with HIV in Guinea-Bissau	2022	Wrong outcome
Dzinamarira, T. and Murewanhema, G. and Chitungo, I. and Ngara, B. and Nkambule, S. J. and Madziva, R. and Herrera, H. and Mukwenha, S. and Cuadros, D. F. and Iradukunda, P. G. and Mashora, M. and Tungwarara, N. and Rwibasira, G. N. and Musuka, G.	Risk of mortality in HIV-infected COVID-19 patients: A systematic review and meta-analysis	2022	Paediatric data
Ebrahimi, A. and Sayad, B. and Rahimi, Z.	COVID-19 and psoriasis: biologic treatment and challenges	2022	Duplicate
Edara, L. and Suvvari, T. K. and Kutikuppala, L. V. S.	High Dose Steroid Therapy to Prevent Severe Hypoxia in COVID-	2020	Wrong population

	19 Patients: A Potential Solution for Low Resource Clinical Setting		
Efimov, S. V. and Matsiyeuskaya, N. V. and Boytsova, O. V. and Akhieva, L. Y. and Kuntsevich, E. V. and Troshina, A. A. and Kvasova, E. I. and Tikhonov, A. A. and Khomyakova, N. F. and Harrison, F. and Rossi, J. F. and Hardman, T. C.	Open-label use of an aliphatic polyamine immunomodulator in patients hospitalized with COVID-19	2022	Wrong population
Eiting, M. M. and Phillips, K. and Smith, L.	The Evolution of Mortality in Kidney Transplant Recipients at a Single Center in the Era of Covid	2022	Insufficient original data
El Karoui, Khalil and De Vriese, An S	COVID-19 in dialysis: clinical impact, immune response, prevention and treatment	2022	Incorrect study design
Elaiw, A. M. and Al Agha, A. D. and Azoz, S. A. and Ramadan, E.	Global analysis of within-host SARS-CoV-2/HIV coinfection model with latency	2022	Wrong outcome
Elemam, N. M. and Maghazachi, A. A. and Hannawi, S.	COVID-19 infection and rheumatoid arthritis: mutual outburst cytokines and remedies	2021	Wrong outcome
ElGohary, Ghada M and Hashmi, Shahrukh and Styczynski, Jan and Kharfan-Dabaja, Mohamed A and Alblooshi, Rehab M and de la CÃ¡mara, Rafael and Mohmed, Sherif and Alshaibani, Alfadel and Cesaro, Simone and Abd El-Aziz, Nashwa	The risk and prognosis of COVID-19 infection in cancer patients: A systematic review and meta-analysis	2020	n<50
Elhadi, M. and Momen, A. A. and Abdulhadi, Omas and Msherghi, A.	Multi-organ failure after acute kidney injury in patient with HIV and COVID-19	2020	Incorrect study design
El-Malky, A. M. and YA, S. Albalawi and Alanazi, S. M. and Saed Albalawi, M. A. and Althobaiti, A. N. and ZA, A. Kassarah and HA, I. Alzahrani and AS, A. Al-Balawi	Severe acute respiratory syndrome coronavirus 2 and risk of inhospital mortality among end-stage renal disease patients with rheumatoid arthritis: A scientific perspective	2021	Compound risk group
El-Qushayri, A. E. and Nardone, B.	Psoriasis exacerbation after COVID-19 vaccines: A brief report of the reported cases	2022	Wrong outcome
Emmi, Giacomo and Bettiol, Aless and ra and Mattioli, Irene and Silvestri, Elena and Di Scala, Gerardo and Urban, Maria Letizia and Vaglio, Augusto and Prisco, Domenico	SARS-CoV-2 infection among patients with systemic autoimmune diseases	2020	Incorrect study design
ErkoÃ§, M. and Ã–ztÃ¼rk, BÃ– and Mungan, D. and Ã–ztuna, D. and Bavbek, S. and Demirel, Y. S. and AydÄ±n, Ã– and Sin, B. A.	Allergen-specific immunotherapy practices and course of coronavirus disease 2019 (COVID-19) in patients during COVID-19	2022	Wrong population
Esmaeilzadeh, A. and Rostami, S. and Yeganeh, P. M. and Tahmasebi, S. and Ahmadi, M.	Recent advances in antibody-based immunotherapy strategies for COVID-19	2021	Wrong population
Eybpoosh, S. and Afshari, M. and Haghdoost, A. A. and Afsar Kazerooni, P. and Gouya, M. M. and Tayeri, K.	Severity and mortality of COVID-19 infection in HIV-infected individuals: Preliminary findings from Iran	2021	n<50
FacciolÃ , A. and D'Amato, S. and Calimeri, S. and Giudice, D. L. and Micali, C. and Russotto, Y. and Venanzi Rullo, E. and Nunnari, G. and Squeri, R. and PellicanÃ², G. F.	Efficacy of COVID-19 Vaccination in People Living with HIV: A Public Health Fundamental Tool for the Protection of Patients and the Correct Management of Infection	2022	Wrong outcome
Fathi, M. and Vakili, K. and Jazi, K. and Sadeghi, M. A. and Hajiesmaeili, M. and Mohamadkhani, A. and Rezaei-Tavirani, M. and Tavasol, A.	Challenges of cancer immunotherapy and chemotherapy during the COVID-19 pandemic	2022	Duplicate
Favalli, Ennio Giulio and Bugatti, Serena and Klersy, Catherine and Biggioggero, Martina and Rossi, Silvia and De Lucia, Orazio and Bobbio-Pallavicini, Francesca and Murgo, Antonella and Balduzzi, Silvia and Caporali, Roberto	Impact of corticosteroids and immunosuppressive therapies on symptomatic SARS-CoV-2 infection in a large cohort of patients with chronic inflammatory arthritis	2020	Wrong outcome
Fehr, D. and LebouchÃ©, B. and Ruppenthal, L. and Brownc, M. and Obasc, N. and BourbonniÃ¨re, E. and Girouard, J. and Massicotte, A. and Jenabian, M. A. and Almomen, A. A. and Frenette, C. and de Pokom and y, A. and Cox, J. and Giannakis, A. and Cheng, M. and Kronfli, N. and Tsoukas, C. and Zahedi, N. and Szabo, J. and Dehghani, K. and Brouillette, M. J. and Falutz, J. and Turner, H. and Hamel, A. and Duchesneau, C. and	Characterization of people living with HIV in a Montreal-based tertiary care center with COVID-19 during the first wave of the pandemic	2022	n<50

Lanthier-Brun, J. and Klein, M. and Routy, J. P. and Costiniuk, C. T.			
Feitosa, M. R. and Parra, R. S. and de Camargo, H. P. and Ferreira, S. D. C. and Troncon, L. E. A. and da Rocha, J. J. R. and FÃ©res, O.	COVID-19 quarantine measures are associated with negative social impacts and compromised follow-up care in patients with inflammatory bowel disease in Brazil	2021	Wrong outcome
Fenig, Y. and Santeusanio, A. and Menon, M. and Liu, C. and Rana, M. and Shapiro, R.	Influence of immunosuppressant management on mortality in kidney transplant recipients hospitalized with covid-19	2021	n<50
Ferraccioli, E. S. and Gremese, E. and Ferraccioli, G.	Morbidity and Mortality From COVID-19 Are Not Increased Among Children or Patients With Autoimmune Rheumatic Disease-Possible Immunologic Rationale: Comment on the Article by Henderson et al	2020	Wrong population
Ferri, C. and Raimondo, V. and Gragnani, L. and Giuggioli, D. and Dagna, L. and Tavoni, A. and Ursini, F. and L'Andolina, M. and Caso, F. and Ruscitti, P. and Caminiti, M. and Foti, R. and Riccieri, V. and Guiducci, S. and Pellegrini, R. and Zanatta, E. and Varcasia, G. and Olivo, D. and Gigliotti, P. and Cuomo, G. and Murdaca, G. and Cecchetti, R. and De Angelis, R. and Romeo, N. and Ingegnoli, F. and Cozzi, F. and Codullo, V. and Cavazzana, I. and Colaci, M. and Abignano, G. and De Santis, M. and Lubrano, E. and Fusaro, E. and Spinella, A. and Lumetti, F. and De Luca, G. and Bell and o-R and one, S. and Visalli, E. and Dal Bosco, Y. and Amato, G. and Giannini, D. and Bilia, S. and Masini, F. and Pellegrino, G. and Pigatto, E. and Generali, E. and Mariano, G. P. and Pettiti, G. and Zanframundo, G. and Brittelli, R. and Aiello, V. and Caminiti, R. and Scorpiniti, D. and Ferrari, T. and Campochiaro, C. and Brusi, V. and Fredi, M. and Moschetti, L. and Cacciapaglia, F. and Paparo, S. R. and Ragusa, F. and Mazzi, V. and Elia, G. and Ferrari, S. M. and Di Cola, I. and Vadacca, M. and Lorusso, S. and Monti, M. and Lorini, S. and Aprile, M. L. and Tasso, M. and Miccoli, M. and Bosello, S. and D'Angelo, S. and Doria, A. and Franceschini, F. and Meliconi, R. and Matucci-Cerinic, M. and Iannone, F. and Giacomelli, R. and Salvarani, C. and Zignego, A. L. and Fallahi, P. and Antonelli, A.	Prevalence and Death Rate of COVID-19 in Autoimmune Systemic Diseases in the First Three Pandemic Waves. Relationship with Disease Subgroups and Ongoing Therapies	2022	Duplicate
Feuillet, V. and Canard, B. and Trautmann, A.	Combining Antivirals and Immunomodulators to Fight COVID-19	2021	Wrong population
Fisher, M. C. and Fazzari, M. J. and Hanna, D. B. and Patel, V. V. and Felsen, U. R. and Alahiri, E. and Byju, A. and Akiyama, M. J. and Ginsberg, M. S. and Anastos, K. and Ross, M. J.	Brief Report: Acute Kidney Injury in People Living With HIV Hospitalized With Coronavirus Disease 2019: Clinical Characteristics and Outcomes	2021	Wrong outcome
Fishman, Jay A	The immunocompromised transplant recipient and SARS-CoV-2 infection	2020	Incorrect study design
Flanagan, C. F. and McCann, N. and Stover, J. and Freedberg, K. A. and Ciaranello, A. L.	Do not forget the children: a model-based analysis on the potential impact of COVID-19-associated interruptions in paediatric HIV prevention and care	2022	Wrong population
Fleischer, B. and Olum, R. and Nakwagala, F. N. and Nassozi, D. R. and Pitua, I. and Paintsil, E. and Baluku, J. B. and Bongomin, F.	Higher intensive care unit consultations for COVID-19 patients living with HIV compared to those without HIV coinfection in Uganda	2022	n<50
Fox, T. A. and Troy-Barnes, E. and Kirkwood, A. A. and Chan, W. Y. and Day, J. W. and Chavda, S. J. and Kumar, E. A. and David, K. and Tomkins, O. and Sanchez, E. and Scully, M. and Khwaja, A. and Lambert, J. and Singer, M. and Roddie, C. and Morris, E. C. and Yong, K. L. and Thomson, K. J. and Ardeshna, K. M.	Response to 'Impact of immunosuppression on mortality in critically ill COVID-19 patients'	2020	Wrong outcome

Fox, T. A. and Troy-Barnes, E. and Kirkwood, A. A. and Chan, W. Y. and Day, J. W. and Chavda, S. J. and Kumar, E. A. and David, K. and Tomkins, O. and Sanchez, E. and Scully, M. and Khwaja, A. and Lambert, J. and Singer, M. and Roddie, C. and Morris, E. C. and Yong, K. L. and Thomson, K. J. and Ardeshna, K. M.	Clinical outcomes and risk factors for severe COVID-19 in patients with haematological disorders receiving chemo- or immunotherapy	2020	Single centre
Franke, K.	COVID-19 after liver transplant: Mortality is comparable with other patient groups. [German]	2020	Foreign language
Franquet, T. and Domingo, P.	Pulmonary Infections in People Living with HIV	2022	Wrong outcome
Fung, Monica and Chiu, Charles Y and DeVoe, Catherine and Doernberg, Sarah B and Schwartz, Brian S and Langelier, Charles and Henrich, Timothy J and Yokoe, Deborah and Davis, John and Hays, Steven R	Clinical outcomes and serologic response in solid organ transplant recipients with COVID-19: a case series from the United States	2020	n<50
GÃ¡lvez-Romero, J. L. and Palmeros-Rojas, O. and Real-RamÃrez, F. A. and SÃ¡nchez-Romero, S. and Tome-Maxil, R. and RamÃrez-S and oval, M. P. and Olivos-RodrÃguez, R. and Flores-EncarnaciÃ³n, S. E. and Cabrera-Estrada, A. A. and Ã□vila-Morales, J. and CortÃ©s-SÃ¡nchez, V. and Sarmiento-Padilla, G. and Tezmol-RamÃrez, S. E. and Aparicio-HernÃ¡ndez, D. and Urbina-SÃ¡nchez, M. I. and GÃ³mez-Pluma, MÃ□ and Cisneros-MÃ©ndez, S. and RodrÃguez-Rivas, D. I. and Reyes-Inurrigarro, S. and CortÃ©s-DÃaz, G. and Cruz-Delgado, C. and Navarro-GonzÃ¡lez, J. and Deveaux-Homs, J. and Pedraza-SÃ¡nchez, S.	Cyclosporine A plus low-dose steroid treatment in COVID-19 improves clinical outcomes in patients with moderate to severe disease: A pilot study	2021	Wrong population
Gaitzsch, Erik and Passerini, Verena and Khatamzas, Elham and Strobl, Carolin D and Muenchhoff, Maximilian and Scherer, Clemens and Osterman, Andreas and Heide, Michael and Reischer, Anna and Subklewe, Marion	COVID-19 in patients receiving CD20-depleting immunochemotherapy for B-cell lymphoma	2021	n<50
Gamboa, E. and Duran, M. and Gathe, J. C., Jr. and Surani, S. and Varon, J.	COVID-19 Coexisting With the Human Immunodeficiency Virus: A Case Report	2020	n<50
Gapud, E. J. and Kronbichler, A. and Gauckler, P. and Geetha, D.	Immunotherapy for ANCA-associated vasculitis during the COVID-19 pandemic	2020	Insufficient original data
Gasmi, A. and Tippairote, T. and Mujawdiya, P. K. and Peana, M. and Menzel, A. and Dadar, M. and Gasmi Benahmed, A. and BjÃ¸rklund, G.	Micronutrients as immunomodulatory tools for COVID-19 management	2020	Wrong population
Gavriilidis, P. and Pai, M.	The Impact of COVID-19 Global Pandemic on Morbidity and Mortality of Liver Transplant Recipients Children and Adults: A Systematic Review of Case Series	2020	Wrong outcome
Gaziano, R. and Pistoia, E. S. and Campione, E. and Fontana, C. and Marino, D. and Favaro, M. and Pica, F. and Di Francesco, P.	Immunomodulatory agents as potential therapeutic or preventive strategies for COVID-19	2021	Wrong outcome
Gazzaruso, C. and Mariani, G. and Ravetto, C. and Malinverni, L. and Tondelli, E. and Cerrone, M. and Sala, V. and Bevilacqua, L. and Altavilla, T. and Coppola, A. and Gallotti, P.	Lupus anticoagulant and mortality in patients hospitalized for COVID-19	2021	Wrong population
Gendron, N. and Dragon-Durey, M. A. and Chocron, R. and Darnige, L. and Jourdi, G. and Philippe, A. and Chenevier-Gobeaux, C. and Hadjadj, J. and Duchemin, J. and Khider, L. and Yatim, N. and Goudot, G. and Krzisch, D. and Debuc, B. and Mauge, L. and Levavasseur, F. and Pene, F. and Boussier, J. and Sourdeau, E. and Brichet, J. and Ochat, N. and Goulvestre, C. and Peronino, C. and Szwebel, T. A. and Pages, F. and Gaussem, P. and Samama, C. M. and Cheurfa, C. and Planquette, B. and Sanchez, O. and Diehl, J. L. and Mirault, T. and Fontenay, M. and Terrier, B. and Smadja, D. M.	Lupus Anticoagulant Single Positivity During the Acute Phase of COVID-19 Is Not Associated With Venous Thromboembolism or In-Hospital Mortality	2021	Wrong population
Gendron, N. and Dragon-Durey, M. A. and Chocron, R. and Darnige, L. and Jourdi, G. and Philippe, A. and Hadjadj, J. and Duchemin, J. and Khider, L. and Yatim, N. and Mauge, L. and Gaussem, P. and Samama, C. M. and	Lupus anticoagulant positivity is not associated with venous thromboembolism or in-hospital mortality in COVID-19	2021	Wrong population

Planquette, B. and Sanchez, O. and Diehl, J. L. and Mirault, T. and Fontenay, M. and Terrier, B. and Smadja, D. M.			
Geretti, Anna Maria and Stockdale, Alex and er J and Kelly, Sophie H and Cevik, Muge and Collins, Simon and Waters, Laura and Villa, Giovanni and Docherty, Annemarie and Harrison, Ewen M and Turtle, Lance	Outcomes of coronavirus disease 2019 (COVID-19) related hospitalization among people with human immunodeficiency virus (HIV) in the ISARIC World Health Organization (WHO) clinical characterization protocol (UK): a prospective observational study	2021	Duplicate
Ghosh, N. and Tirpack, A. and Chan, K. K. and Bass, A. R.	Impact of COVID-19 on patients with rheumatic complications of cancer immunotherapy: results of a registry survey	2020	Wrong outcome
Gilissen, L. P. L. and Heinen, S. G. H. and Rijpma-Jacobs, L. and Schoon, E. and Schreuder, R. M. and Wensing, A. M. and van der Ende-van Loon, M. C. M. and Bloemen, J. G. and Stapelbroek, J. M. and Stronkhorst, A.	Neither inflammatory bowel disease nor immunosuppressants are associated with an increased risk of severe COVID-19: an observational Dutch cohort study	2022	Single centre
Ginzberg, D. and Pierce, K. and Kreiger-Benson, E. and Graves, M. and Neumann, H. and Ali, N. and Gidea, C. and Park, J. and Mehta, S.	Clinical signs predictive of covid-19 mortality among transplant recipients	2021	Single centre
Gisondi, P. and Bellinato, F. and Chiricozzi, A. and Girolomoni, G.	The Risk of COVID-19 Pandemic in Patients with Moderate to Severe Plaque Psoriasis Receiving Systemic Treatments	2020	Insufficient original data
Gisondi, P. and Zaza, G. and Del Giglio, M. and Rossi, M. and Iacono, V. and Girolomoni, G.	Risk of hospitalization and death from COVID-19 infection in patients with chronic plaque psoriasis receiving a biological treatment and renal transplanted recipients in maintenance immunosuppressive treatment	2020	Incorrect study design
Goldman, J. D. and Gonzalez, M. A. and RÃ¼thrich, M. M. and Sharon, E. and von Lilienfeld-Toal, M.	COVID-19 and Cancer: Special Considerations for Patients Receiving Immunotherapy and Immunosuppressive Cancer Therapies	2022	Insufficient original data
Goldman, J. D. and Robinson, P. C. and Uldrick, T. S. and Ljungman, P.	COVID-19 in immunocompromised populations: implications for prognosis and repurposing of immunotherapies	2021	Incorrect study design
Golin, R. and Godfrey, C. and Firth, J. and Lee, L. and Minior, T. and Phelps, B. R. and Raizes, E. G. and Ake, J. A. and Siberry, G. K.	PEPFAR's response to the convergence of the HIV and COVID-19 pandemics in Sub-Saharan Africa	2020	Wrong outcome
Gottlieb, R. L. and Askar, M. and Chen, L. and Ch and ak, A. and Mozaffari, E. and Thrun, M. and Haubrich, R.	Clinical Outcomes in a Large Transplant Cohort Hospitalized with COVID-19: Mycophenolate Mofetil (MMF) Utilization and Mortality Trends	2022	Insufficient original data
Govender, R. and Moodley, J. and Naicker, T.	The COVID-19 Pandemic: an Appraisal of its Impact on Human Immunodeficiency Virus Infection and Pre-Eclampsia	2021	Wrong population
Goyal, A. and Joshi, A. and Saigal, S. and Brahmam, D. and Niwariya, Y. and Khurana, A. and Khadanga, S. and Mitra, A.	Whether Early Steroid dose is associated with lower mortality in COVID-19 critically ill Patients- An exploratory chart review	2022	Wrong population
Graff, L. A. and Fowler, S. and Jones, J. L. and Benchimol, E. I. and Bitton, A. and Huang, J. G. and Kuenzig, M. E. and Kaplan, G. G. and Lee, K. and Mukhtar, M. S. and T and on, P. and Targownik, L. E. and Windsor, J. W. and Bernstein, C. N.	Crohn's and Colitis Canada's 2021 Impact of COVID-19 and Inflammatory Bowel Disease in Canada: Mental Health and Quality of Life	2021	Wrong outcome
Grange, Lucile and Guilpain, Philippe and Truchetet, Marie-Elise and Cracowski, Jean-Luc and Pharmacology, French Society of and Therapeutics	Challenges of autoimmune rheumatic disease treatment during the COVID-19 pandemic: a review	2020	Incorrect study design
Granger, Camille and Guedeney, Paul and Arnaud, Camille and Guendouz, Soulef and Cimadevilla, Claire and Kerneis, Mathieu and Kerneis, Caroline and Zeitouni, Michel and Verdonk, Constance and Legeai, Camille	Clinical manifestations and outcomes of coronavirus diseaseâ€□19 in heart transplant recipients: a multicentre case series with a systematic review and metaâ€□analysis	2021	n<50

Granholm, A. and Munch, M. W. and Andersen-Ranberg, N. and Myatra, S. N. and Vijayaraghavan, B. K. T. and Venkatesh, B. and Jha, V. and Wahlin, R. R. and Jakob, S. M. and Cioccari, L. and MÃ¸ller, M. H. and Perner, A.	Heterogeneous treatment effects of dexamethasone 12â€‰mg versus 6â€‰mg in patients with COVID-19 and severe hypoxaemia-Post hoc exploratory analyses of the COVID STEROID 2 trial	2022	Wrong population
Granholm, A. and Munch, M. W. and Myatra, S. N. and Vijayaraghavan, B. K. T. and Cronhjort, M. and Wahlin, R. R. and Jakob, S. M. and Cioccari, L. and KjÃ¦r, M. N. and Vesterlund, G. K. and Meyhoff, T. S. and Helleberg, M. and MÃ¸ller, M. H. and Benfield, T. and Venkatesh, B. and Hammond, N. E. and Micallef, S. and Bassi, A. and John, O. and Jha, V. and Kristiansen, K. T. and Ulrik, C. S. and JÃ¸rgensen, V. L. and Smitt, M. and Bestle, M. H. and Andreasen, A. S. and Poulsen, L. M. and Rasmussen, B. S. and BrÃ¸chner, A. C. and StrÃ¸m, T. and MÃ¸ller, A. and Khan, M. S. and Padmanaban, A. and Divatia, J. V. and Saseedharan, S. and Borawake, K. and Kapadia, F. and Dixit, S. and Chawla, R. and Shukla, U. and Amin, P. and Chew, M. S. and Wamberg, C. A. and Gluud, C. and Lange, T. and Perner, A.	Dexamethasone 12Â mg versus 6Â mg for patients with COVID-19 and severe hypoxaemia: a pre-planned, secondary Bayesian analysis of the COVID STEROID 2 trial	2022	Wrong population
Granholm, A. and Munch, M. W. and Myatra, S. N. and Vijayaraghavan, B. K. T. and Cronhjort, M. and Wahlin, R. R. and Jakob, S. M. and Cioccari, L. and Kjaer, M. N. and Vesterlund, G. K. and Meyhoff, T. S. and Helleberg, M. and MÃ¸ller, M. H. and Benfield, T. and Venkatesh, B. and Hammond, N. and Micallef, S. and Bassi, A. and John, O. and Jha, V. and Kristiansen, K. T. and Ulrik, C. S. and JÃ¸rgensen, V. L. and Smitt, M. and Bestle, M. H. and Andreasen, A. S. and Poulsen, L. M. and Rasmussen, B. S. and BrÃ¸chner, A. C. and StrÃ¸m, T. and MÃ¸ller, A. and Khan, M. S. and Padmanaban, A. and Divatia, J. V. and Saseedharan, S. and Borawake, K. and Kapadia, F. and Dixit, S. and Chawla, R. and Shukla, U. and Amin, P. and Chew, M. S. and Gluud, C. and Lange, T. and Perner, A.	Higher vs Lower Doses of Dexamethasone in Patients with COVID-19 and Severe Hypoxia (COVID STEROID 2) trial: Protocol for a secondary Bayesian analysis	2021	Incorrect study design
Gravett, R. M. and Marrazzo, J. M.	HIV and COVID-19: Lessons From HIV and STI Harm Reduction Strategies	2021	Wrong outcome
Grawert, S.	COVID-19 mortality in patients with rheumatoid arthritis. [German]	2021	Foreign language
Gudipati, S. and Brar, I. and Murray, S. and McKinnon, J. E. and Yared, N. and Markowitz, N.	Descriptive Analysis of Patients Living With HIV Affected by COVID-19	2020	n<50
Guisado-Vasco, P. and Valderas-Ortega, S. and CarralÃ³n-GonzÃ¡lez, M. M. and Roda-Santacruz, A. and GonzÃ¡lez-Cortijo, L. and Sotres-FernÃ¡ndez, G. and MartÃ-Ballesteros, E. M. and Luque-Pinilla, J. M. and Almagro-Casado, E. and La Coma-Lanuza, F. J. and Barrena-Puertas, R. and Malo-Benages, E. J. and Monforte-GÃ³mez, M. J. and Diez-Munar, R. and Merino-Lanza, E. and Comeche-Casanova, L. and Remirez-de-Esparza-Otero, M. and Correyero-Plaza, M. and Recio-RodrÃguez, M. and RodrÃguez-LÃ³pez, M. and SÃ¡nchez-Manzano, M. D. and Andreu-VÃ¡zquez, C. and Thuissard-Vasallo, I. J. and MarÃa-TomÃ©, J. M. E. and Carnevali-Ruiz, D.	Clinical characteristics and outcomes among hospitalized adults with severe COVID-19 admitted to a tertiary medical center and receiving antiviral, antimalarials, glucocorticoids, or immunomodulation with tocilizumab or cyclosporine: A retrospective observational study (COQUIMA cohort)	2020	Immunosuppressio n as treatment
Gunaratne, S. H. and Tieu, H. V. and Wilkin, T. J. and Taylor, B. S.	CROI 2021: Advances in Antiretroviral Therapy for HIV and Antiviral Therapy for COVID-19	2021	Wrong outcome
Gundogdu, O. and Demir, B. and Coskun, C. O. and Ersan, I.	Efficacy of pulse steroid therapy in patients critically ill with COVID-19	2021	Wrong outcome
Gupta, A. and Shivaji, K. and Kadam, S. and Gupta, M. and Rodriguez, H. C. and Potty, A. G. and El-Amin, S. F., 3rd and Maffulli, N.	Immunomodulatory extracellular vesicles: an alternative to cell therapy for COVID-19	2021	Wrong population
Gupta, T. and Debele, T. A. and Wei, Y. F. and Gupta, A. and Murtaza, M. and Su, W. P.	Synergistic Action of Immunotherapy and Nanotherapy against Cancer	2022	Wrong outcome

	Patients Infected with SARS-CoV-2 and the Use of Artificial Intelligence		
Gurion, R. and Rozovski, U. and Itchaki, G. and Gafter-Gvili, A. and Leibovitch, C. and Raanani, P. and Ben-Zvi, H. and Szwarcwort, M. and Taylor-Abigadol, M. and Dann, E. J. and Horesh, N. and Inbar, T. and Tzoran, I. and Lavi, N. and Fineman, R. and Ringelstein-Harlev, S. and Horowitz, N. A.	Humoral serological response to the BNT162b2 vaccine is abrogated in lymphoma patients within the first 12 months following treatment with anti-CD2O antibodies	2022	Wrong outcome
Gutierrez, M. D. M. and Mur, I. and Mateo, M. G. and Vidal, F. and Domingo, P.	Pharmacological considerations for the treatment of COVID-19 in people living with HIV (PLWH)	2021	Wrong outcome
Gyebi, G. A. and Ogunyemi, O. M. and Ibrahim, I. M. and Afolabi, S. O. and Adebayo, J. O.	Dual targeting of cytokine storm and viral replication in COVID-19 by plant-derived steroidal pregnanes: An in silico perspective	2021	Incorrect study design
HÃ¤rter, G. and Spinner, C. D. and Roider, J. and Bickel, M. and Krznaric, I. and Grunwald, S. and Schabaz, F. and Gillor, D. and Postel, N. and Mueller, M. C. and MÃ¼ller, M. and RÃ¶mer, K. and Schewe, K. and Hoffmann, C.	COVID-19 in people living with human immunodeficiency virus: a case series of 33 patients	2020	n<50
Hage, RenÃ© and Steinack, Carolin and Benden, Christian and Schuurmans, MacÃ© M	COVID-19 in patients with solid organ transplantation: a systematic review	2020	n<50
Haller, M. J. and Jacobsen, L. M. and Posgai, A. L. and Schatz, D. A.	How Do We Move Type 1 Diabetes Immunotherapies Forward During the Current COVID-19 Pandemic?	2021	Wrong outcome
Hamiduzzaman, A. and Reddy, U.	Improved Mortality in COVID-19 Kidney Transplant Recipients Treated with Bamlanivimab	2022	Single centre
Hamza, M. and Alhujaily, M. and Alosaimi, B. and El Bakkouri, K. and AlDughaim, M. S. and Alonazi, M. and Alanazi, M. A. and Abbass, B. and Alshehri, A. and Al-Shouli, S. T. and Alturaiki, W. and Awadalla, M.	Association between inflammatory cytokines/chemokines, clinical laboratory parameters, disease severity and in-hospital mortality in critical and mild COVID-19 patients without comorbidities or immune-mediated diseases	2022	Wrong population
Han, X. and Yu, X. and Han, Y. and Fang, Q. and Shen, C. and Liu, H. and Wang, P. and Wang, Y. and Li, X.	Safety and Immunogenicity of Inactivated COVID-19 Vaccines Among People Living with HIV in China	2022	Wrong population
Hanif, F. and Satiti, S. and Subagya, S. and Retnowulan, H. and Subronto, Y. W. and Mulya, D. P. and Ar Rochmah, M.	Progressive Worsening of Neurological Manifestations in HIV-Associated Opportunistic Central Nervous System (CNS) Infection Patients After COVID-19 Vaccinations: A Possible Co-Incidence Causality	2022	Wrong outcome
Hannan, T. B. and Paul, S. and Barai, L. and Alam, M. R. and Chowdhury, F. R.	Rhino-Orbital Mucormycosis After COVID-19 Infection in a Patient With Non-Hodgkin's Lymphoma	2022	n<50
Hardgrave, H. and Wells, A. and Nigh, J. and Klutts, G. and Krinock, D. and Osborn, T. and Bhusal, S. and Rude, M. K. and Burdine, L. and Giorgakis, E.	COVID-19 Mortality in Vaccinated vs. Unvaccinated Liver & Kidney Transplant Recipients: A Single-Center United States Propensity Score Matching Study on Historical Data	2022	Insufficient original data
Hardy, Y. O. and Amenuke, D. A. and Hutton-Mensah, K. A. and Chadwick, D. R. and Larsen-Reindorf, R.	Presentation and outcome of COVID-19 in HIV patients with high viral loads and opportunistic infections: a case series	2020	n<50
Hariyanto, T. I. and Putri, C. and Frinka, P. and Louisa, J. and Lugito, N. P. H. and Kurniawan, A.	Human Immunodeficiency Virus (HIV) and outcomes from coronavirus disease 2019 (COVID-19) pneumonia: A Meta-Analysis and Meta-Regression	2021	Incorrect study design
Harthan, A. A. and Nadiger, M. and McGarvey, J. S. and Hanson, K. and Gharpure, V. P. and Bjornstad, E. C. and Chiotos, K. and Miller, A. S. and Reikoff, R. A. and Gajic, O. and Kumar, V. and Walkey, A. J. and Kashyap, R. and Tripathi, S.	Early combination therapy with immunoglobulin and steroids is associated with shorter ICU length of stay in Multisystem Inflammatory Syndrome in Children (MIS-C) associated with COVID-19: A retrospective cohort analysis from 28 U.S. Hospitals	2022	Wrong population

Hassan, A. T. and Elmoniem, A. E. A. and Abdelrady, M. M. and Mohamed, M. E. and Mokhtar, M. A. and Elsherif, A. A. and Saied, G. M. and Kasem, S. M.	Challenges in Steroid and Anticoagulant Therapy in Severe COVID-19 Pneumonia: A Prospective Study	2021	Wrong population
Hejazian, S. S. and Hejazian, S. M. and Farnood, F. and Abedi Azar, S.	Dysregulation of immunity in COVID-19 and SLE	2022	Insufficient original data
Heldman, M. R. and Kates, O. S. and Safa, K. and Kotton, C. N. and Multani, A. and Georgia, S. J. and Steinbrink, J. M. and Alex and er, B. D. and Blumberg, E. A. and Haydel, B. and Hemmige, V. and Hemmersbach-Miller, M. and La Hoz, R. M. and Moni, L. and Condor, Y. and Flores, S. and Munoz, C. G. and Guitierrez, J. and Diaz, E. I. and Diaz, D. and Vianna, R. and Guerra, G. and Loebe, M. and Yabu, J. M. and Kramer, K. H. and Tanna, S. D. and Ison, M. G. and Rakita, R. M. and Malinis, M. and Azar, M. M. and McCort, M. E. and Singh, P. P. and Velioglu, A. and Mehta, S. A. and van Duin, D. and Goldman, J. D. and Lease, E. D. and Wald, A. and Limaye, A. P. and Fisher, C. E. and Team, U. W. Covid-19 SOT Study	Delayed mortality among solid organ transplant recipients hospitalized for COVID-19	2022	Duplicate
Heldman, M. R. and Rakita, R. M. and Lease, E. D. and Fisher, C. E. and Limaye, A. P.	Apples to apples: The challenges of studying COVID-19 mortality in solid organ transplant recipients	2022	Incorrect study design
Heldman, Madeleine R and Kates, Olivia S and Fisher, Cynthia E and Limaye, Ajit P	Immunosuppression in solid organ transplant recipients with COVID-19: More data, but still complicated	2021	Incorrect study design
Heldman, Madeleine R and Kates, Olivia S and Safa, Kassem and Kotton, Camille N and Georgia, Sarah J and Steinbrink, Julie M and Alex and er, Barbara D and Hemmersbachâ€Miller, Marion and Blumberg, Emily A and Crespo, Maria M	COVID-19 in hospitalized lung and nonâ€lung solid organ transplant recipients: a comparative analysis from a multicenter study	2021	Duplicate
Hendrickx, Rodinde and Jellingso, Mads and Sommer, Morten OA	Kidney patients remain at increased risk for succumbing to COVID-19	2022	Wrong outcome
Ho, M. and Zanwar, S. and Buadi, F. K. and Ailawadhi, S. and Larsen, J. and Bergsagel, L. and Binder, M. and Chanan-Khan, A. and Dingli, D. and Dispenzieri, A. and Fonseca, R. and Gertz, M. A. and Gonsalves, W. and Go, R. S. and Hayman, S. and Kapoor, P. and Kourelis, T. and Lacy, M. Q. and Leung, N. and Lin, Y. and Muchtar, E. and Roy, V. and Sher, T. and Warsame, R. and Fonder, A. and Hobbs, M. and Hwa, Y. L. and Kyle, R. A. and Rajkumar, S. V. and Kumar, S.	Risk factors for severe infection and mortality In patients with COVID-19 in patients with multiple myeloma and AL amyloidosis	2022	Single centre
Hoffman, J. R. H. and Higa, K. C. and Lin, Y. and Reece, T. B. and Clevel and , J. C. and Aftab, M. and Rove, J. Y.	Noteworthy Cardiac Literature From 2021: Coronary Guideline Change Without New Data, Heart Transplant Donation After Cardiac Death, Covid Effects on Global Cardiac Surgery, and Attempt to Improve Dissection Remodeling	2022	Indirect mortality
Hoffmann, M. S. and Ganguly, S.	Delayed COVID-19 Respiratory Failure in Patients with Lymphoma on Rituximab-based Chemoimmunotherapy	2021	n<50
Holtgrave, D. R. and Valdiserri, R. O. and Kalichman, S. C. and Del Rio, C. and Thompson, M.	Core Elements of a National COVID-19 Strategy: Lessons Learned from the US National HIV/AIDS Strategy	2020	Insufficient original data
Hornuss, D. and Giesen, R. and Biever, P. and Kern, W. V.	[Clinical benefit of Tocilizumab and other immunomodulating agents for treatment of COVID-19]	2021	Foreign language
Houle, B. and Kabudula, C. W. and Tilstra, A. M. and Mojola, S. A. and Schatz, E. and Clark, S. J. and Angotti, N. and GÃ³mez-OlivÃ©, F. X. and Menken, J.	Twin epidemics: the effects of HIV and systolic blood pressure on mortality risk in rural South Africa, 2010-2019	2022	Wrong outcome
Hu, H. and Tang, N. and Zhang, F. and Li, L. and Li, L.	Bioinformatics and System Biology Approach to Identify the Influences of COVID-19 on Rheumatoid Arthritis	2022	Wrong outcome
Huang, D. and Zunong, J. and Li, M. and Li, D. and Gong, J. and Vermund, S. H. and Hu, Y.	COVID-19 Clinical Presentation Among HIV-Infected Persons in China: A Systematic Review	2022	n<50

Huang, X. and Yu, M. and Fu, G. and Lan, G. and Li, L. and Yang, J. and Qiao, Y. and Zhao, J. and Qian, H. Z. and Zhang, X. and Liu, X. and Jin, X. and Chen, G. and Jiang, H. and Tang, W. and Wang, Z. and Xu, J.	Willingness to Receive COVID-19 Vaccination Among People Living With HIV and AIDS in China: Nationwide Cross-sectional Online Survey	2021	Wrong outcome
Hudzik, B. and Nowak, J. and Zubelewicz-Szkodzinska, B.	Consideration of immunomodulatory actions of morphine in COVID-19 - Short report	2020	Incorrect study design
Hugo, C. and Vehreschild, J. and Stecher, M.	Response to Invited Commentary "Undoubtedly, kidney transplant recipients have a higher mortality due to COVID-19 disease compared to the general population"	2021	Incorrect study design
Hyder Pottoo, F. and Abu-Izneid, T. and Mohammad Ibrahim, A. and Noushad Javed, M. and AlHajri, N. and Hamrouni, A. M.	Immune system response during viral Infections:Â Immunomodulators, cytokine storm (CS) and Immunotherapeutics in COVID-19	2021	Incorrect study design
Hyrich, Kimme L and Machado, Pedro M	Rheumatic disease and COVID-19: epidemiology and outcomes	2021	Incorrect study design
Imai, R. and Ro, S. and Tomishima, Y. and Nishimura, N.	Steroid resistance and rebound phenomena in patients with COVID-19	2021	Wrong population
Inciarte, A. and Gonzalez-Cordon, A. and Rojas, J. and Torres, B. and de Lazzari, E. and de la Mora, L. and Martinez-Rebollar, M. and Laguno, M. and Callau, P. and Gonzalez-Navarro, A. and Leal, L. and Garcia, F. and Mallolas, J. and Mosquera, M. and Marcos, M. A. and Ambrosioni, J. and Miro, J. M. and Martinez, E. and Blanco, J. L.	Clinical characteristics, risk factors, and incidence of symptomatic coronavirus disease 2019 in a large cohort of adults living with HIV: a single-center, prospective observational study	2020	Single centre
Ioannidis, John PA and Axfors, Cathrine and Contopoulos-Ioannidis, Despina G	Population-level COVID-19 mortality risk for non-elderly individuals overall and for non-elderly individuals without underlying diseases in pandemic epicenters	2020	Wrong population
Iovino, L. and Thur, L. A. and Gnjatic, S. and Chapuis, A. and Milano, F. and Hill, J. A.	Shared inflammatory pathways and therapeutic strategies in COVID-19 and cancer immunotherapy	2021	Insufficient original data
Iyer, A. and Shah, J. and Shah, R.	The burden and characteristics of HIV-infected COVID-19 patients at a tertiary care hospital in sub-Saharan Africa-A retrospective cohort study	2022	Single centre
Izudi, J. and Kiragga, A. N. and Kalyesubula, P. and Okoboi, S. and Castelnuovo, B.	Effect of the COVID-19 pandemic restrictions on outcomes of HIV care among adults in Uganda	2022	Wrong outcome
J and aghi, P. and Hosseini, Z. and Chilibeck, P. and Hanley, A. J. and Deguire, J. R. and B and y, B. and Pahwa, P. and Vatanparast, H.	The Role of Immunomodulatory Nutrients in Alleviating Complications Related to SARS-CoV-2: A Scoping Review	2021	Wrong population
Jakharia, N. and Subramanian, A. K. and Shapiro, A. E.	COVID-19 in the Immunocompromised Host, Including People with Human Immunodeficiency Virus	2022	Insufficient original data
Jamil, Z. and Almajhdi, F. N. and Khalid, S. and Asghar, M. and Ahmed, J. and Waheed, Y.	Comparison of Low-Versus High-Dose Steroids in the Clinical Outcome of Hospitalized COVID-19 Patients	2021	Wrong population
Janapala, R. N. and Patel, J. and Belfaqeeh, O. and Alhashmi, A. and Pourm and , A.	Letter to the Editor Regarding Combination of Tocilizumab and Steroids to Improve Mortality in Patients with Severe COVID-19 Infection: A Spanish, Multicenter, Cohort Study	2021	Wrong population
Jassat, W. and Cohen, C. and Tempia, S. and Masha, M. and Goldstein, S. and Kufa, T. and Murang and i, P. and Savulescu, D. and Walaza, S. and Bam, J. L. and Davies, M. A. and Prozesky, H. W. and Naude, J. and Mnguni, A. T. and Lawrence, C. A. and Mathema, H. T. and Zamparini, J. and Black, J. and Mehta, R. and Parker, A. and Chikobvu, P. and Dawood, H. and Muvhango, N. and Strydom, R. and Adelekan, T. and Mdlovu, B. and Moodley, N. and Namavh	Risk factors for COVID-19-related in-hospital mortality in a high HIV and tuberculosis prevalence setting in South Africa: a cohort study	2021	Single centre

and u, E. L. and Rheeder, P. and Venturas, J. and Magula, N. and Blumberg, L.			
Jee, J. and Stonestrom, A. J. and Devlin, S. and Nguyentran, T. and Wills, B. and Narendra, V. and Foote, M. B. and Lumish, M. and Vardhana, S. A. and Pastores, S. M. and Korde, N. and Patel, D. and Horwitz, S. and Scordo, M. and Daniyan, A. F.	Oncologic immunomodulatory agents in patients with cancer and COVID-19	2021	Single centre
Jefferis, K. and Avalos, A. and Phillips, H. and Mmelesi, M. and Ramaabya, D. and Nkomo, B. and Muthoga, C. and Jarvis, J. N. and Ratladi, S. and Selato, R. and Stover, J.	Five years after Treat All implementation: Botswana's HIV response and future directions in the era of COVID-19	2021	Wrong population
Jefferson, Tom and Spencer, Elizabeth A and Rosca, Elena Cecilia and Maltoni, Susanna and Brassey, Jon and Onakpoya, Igho and Pluddemann, Annette and Evans, David H and Conly, John M and Heneghan, Carl	Viral cultures, Polymerase Chain Reaction Cycle Threshold Values and Viral Load Estimation for SARS-CoV-2 Infectious Potential Assessment in Hematopoietic Stem Cell and Solid Organ Transplant Patients: A Systematic Review	2022	Wrong outcome
Jewell, B. L. and Mudimu, E. and Stover, J. and Ten Brink, D. and Phillips, A. N. and Smith, J. A. and Martin-Hughes, R. and Teng, Y. and Glaubius, R. and Mahiane, S. G. and Bansi-Matharu, L. and Taramusi, I. and Chagoma, N. and Morrison, M. and Doherty, M. and Marsh, K. and Bershteyn, A. and Hallett, T. B. and Kelly, S. L.	Potential effects of disruption to HIV programmes in sub-Saharan Africa caused by COVID-19: results from multiple mathematical models	2020	Wrong outcome
Jewell, B. L. and Smith, J. A. and Hallett, T. B.	Understanding the impact of interruptions to HIV services during the COVID-19 pandemic: A modelling study	2020	Wrong outcome
Jin, Y. H. and Jeon, S. and Lee, J. and Kim, S. and Jang, M. S. and Park, C. M. and Song, J. H. and Kim, H. R. and Kwon, S.	Broad Spectrum Antiviral Properties of Cardiotonic Steroids Used as Potential Therapeutics for Emerging Coronavirus Infections	2021	Wrong population
Jodele, S. and KÃ¶hl, J.	Tackling COVID-19 infection through complement-targeted immunotherapy	2021	Wrong population
John, B. V. and Deng, Y. and Khakoo, N. S. and Taddei, T. H. and Kaplan, D. E. and Dahman, B.	COVID-19 Vaccination Is Associated with Reduced SARS CoV2 Infection and Death in Liver Transplant Recipients	2021	Incorrect study design
John, N. A. and John, J. E.	Implication of COVID-19 in patients of HIV with hepatitis C	2022	Compound risk group
Jones, Jessica M and Faruqi, Aiman J and Sullivan, James K and Calabrese, Cass and ra and Calabrese, Leonard H	COVID-19 outcomes in patients undergoing B cell depletion therapy and those with humoral immunodeficiency states: A scoping review	2021	Incorrect study design
Jones, Rachael and Nelson, Mark and Bracchi, Margherita and Asboe, David and Boffito, Marta	COVID-19 in patients with HIV	2020	Incorrect study design
Jou, E. and Zhou, A. K. and Ho, J. S. Y. and Thahir, A.	Perioperative use of intra-articular steroids during the COVID-19 pandemic	2022	Wrong population
Jou, J. and Gupta, M.	A Single-Center Report of Mortality Comparison of COVID-19 Vaccinated Kidney Transplant Recipients	2022	Wrong outcome
Jung, C. and Wernly, B. and FjÃ¸lner, J. and Bruno, R. R. and Dudzinski, D. and Artigas, A. and Bollen Pinto, B. and Schefold, J. C. and Wolff, G. and Kelm, M. and Beil, M. and Sigal, S. and van Heerden, P. V. and Szczeklik, W. and Czuczwar, M. and Elhadi, M. and Joannidis, M. and Oeyen, S. and Zafeiridis, T. and Marsh, B. and Andersen, F. H. and Moreno, R. and Cecconi, M. and Leaver, S. and Boumendil, A. and De Lange, D. W. and Guidet, B. and Flaatten, H.	Steroid use in elderly critically ill COVID-19 patients	2021	Wrong population
Jung, Y. and Kwon, M. and Choi, H. G.	Association between previous rheumatoid arthritis and COVID-19 and its severity: a nationwide cohort study in South Korea	2021	n<50

Junker, A.	COVID-19 patients with bronchial tumors: Chemotherapy leads to a higher mortality risk. [German]	2020	Foreign language
Kaddam, L. and Babiker, R. and Ali, S. and Satti, S. and Ali, N. and Elamin, M. and Mukhtar, M. and Elnimeiri, M. and Saeed, A.	Potential Role of Acacia Senegal (Gum Arabic) as Immunomodulatory Agent among newly diagnosed COVID 19 Patients: A structured summary of a protocol for a randomised, controlled, clinical trial	2020	Wrong population
Kajova, M. and KekÃ¤lÃ¤inen, E. and Anttila, V. J. and Paajanen, J.	Successful treatment with a short course of remdesivir in a case of prolonged COVID-19 in a lymphoma patient	2022	n<50
Kalidhindi, R. S. R. and Borkar, N. A. and Ambhore, N. S. and Pabelick, C. M. and Prakash, Y. S. and Sathish, V.	Sex steroids skew ACE2 expression in human airway: a contributing factor to sex differences in COVID-19?	2020	Wrong population
Kalil, A. C. and Florescu, D. F.	Mortality in solid organ transplant recipients hospitalized for COVID-19	2021	Incorrect study design
Kalil, A. C. and Stebbing, J.	Baricitinib: the first immunomodulatory treatment to reduce COVID-19 mortality in a placebo-controlled trial	2021	Wrong population
Kamath, C. and Brenner, E. J.	The safe use of inflammatory bowel disease therapies during the COVID-19 pandemic	2022	Duplicate
Kaplan, G. G. and Windsor, J. W.	The four epidemiological stages in the global evolution of inflammatory bowel disease	2021	Wrong outcome
Kara Polat, A. and Oguz Topal, I. and Karadag, A. S. and Aksoy, H. and Koku Aksu, A. E. and Ozkur, E. and Ozkok Akbulut, T. and Topaloglu Demir, F. and Engin, B. and Uzuncakmak, T. K. and KÄ±vanc Altunay, I.	The impact of COVID-19 in patients with psoriasis: A multicenter study in Istanbul	2021	Insufficient original data
Karakike, E. and Dalekos, G. N. and Koutsodimitropoulos, I. and Saridaki, M. and Pourzitaki, C. and Papathanakos, G. and Kotsaki, A. and Chalvatzis, S. and Dimakopoulou, V. and Vechlidis, N. and Paramythiotou, E. and Avgoustou, C. and Ioakeimidou, A. and Kouriannidi, E. and Komnos, A. and Neou, E. and Rovina, N. and Stefanatou, E. and Milionis, H. and Nikolaidis, G. and Koutsoukou, A. and Damoraki, G. and Dimopoulos, G. and Zoumpos, V. and Eugen-Olsen, J. and Akinosoglou, K. and Gatselis, N. K. and Koulouras, V. and Gkeka, E. and Markou, N. and Netea, M. G. and Giamarellos-Bourboulis, E. J.	ESCAPE: An Open-Label Trial of Personalized Immunotherapy in Critically Ill COVID-19 Patients	2022	Wrong population
Karasneh, Reema A and Khassawneh, Basheer Y and Al-Azzam, Sayer and Al-Mistarehi, Abdel-Hameed and Lattyak, William J and Aldiab, Motasem and Kabbaha, Suad and Hasan, Syed Shahzad and Conway, Barbara R and Aldeyab, Mamoon A	Risk Factors Associated with Mortality in COVID-19 Hospitalized Patients: Data from the Middle East	2022	Wrong population
Karcher, D. S.	From HIV to Coronavirus Disease 2019 (COVID-19)	2022	Incorrect study design
Karmen-Tuohy, S. and Carlucci, P. M. and Zervou, F. N. and Zacharioudakis, I. M. and Rebick, G. and Klein, E. and Reich, J. and Jones, S. and Rahimian, J.	Outcomes Among HIV-Positive Patients Hospitalized With COVID-19	2020	n<50
Karthik, K. and Senthilkumar, T. M. A. and Udhayavel, S. and Raj, G. D.	Role of antibody-dependent enhancement (ADE) in the virulence of SARS-CoV-2 and its mitigation strategies for the development of vaccines and immunotherapies to counter COVID-19	2020	Incorrect study design
Kassanjee, R. and Davies, M. A. and Ngwenya, O. and Osei-Yeboah, R. and Jacobs, T. and Morden, E. and Timmerman, V. and Britz, S. and Mendelson, M. and Taljaard, J. and Riou, J. and Boulle, A. and Tiffin, N. and Zinyakatira, N.	COVID-19 among adults living with HIV: Correlates of mortality in a general population in a resource-limited setting	2022	Duplicate
Kaswa, R.	The impact of the COVID-19 pandemic on accessing HIV care: A case report	2021	n<50

Kavanagh, M. M. and Agbla, S. C. and Joy, M. and Aneja, K. and Pillinger, M. and Case, A. and Erondu, N. A. and Erkkola, T. and Graeden, E.	Law, criminalisation and HIV in the world: have countries that criminalise achieved more or less successful pandemic response?	2021	Wrong outcome
Kavanagh, M. M. and Katz, I. T. and Holmes, C. B.	Reckoning with mortality: global health, HIV, and the politics of data	2020	Incorrect study design
Kelleni, M. T.	NSAIDs/nitazoxanide/azithromycin repurposed for COVID-19: potential mitigation of the cytokine storm interleukin-6 amplifier via immunomodulatory effects	2022	Wrong population
Kelly, S. and Waters, L. and Cevik, M. and Collins, S. and Lewis, J. and Wu, M. S. and Blanchard, T. J. and Geretti, A. M.	Pneumocystis pneumonia, a COVID-19 mimic, reminds us of the importance of HIV testing in COVID-19	2020	Insufficient original data
Kerkhoff, A. D. and Havlir, D. V.	CROI 2021: Tuberculosis, Opportunistic Infections, and COVID-19 Among People with HIV	2021	Incorrect study design
Khaba, M. C. and Ngale, T. C. and Madala, N.	COVID-19 in an HIV-infected patient. Lessons learned from an autopsy case	2020	n<50
Khairallah, Pascale and Aggarwal, Nidhi and Awan, Ahmed A and Vangala, Ch and an and Airy, Medha and Pan, Jenny S and Murthy, Bhamidipati VR and Winkelmayer, Wolfgang C and Ramanathan, Venkat	The impact of COVID-19 on kidney transplantation and the kidney transplant recipientâ€“One year into the pandemic	2021	Incorrect study design
Khan, K. and Lustig, G. and Bernstein, M. and Archary, D. and Cele, S. and Karim, F. and Smith, M. and Ganga, Y. and Jule, Z. and Reedoy, K. and Miya, Y. and Mthabela, N. and Magula, N. P. and Lessells, R. and de Oliveira, T. and Gosnell, B. I. and Abdool Karim, S. and Garrett, N. and Hanekom, W. and Bekker, L. G. and Gray, G. and Blackburn, J. M. and Moosa, M. S. and Sigal, A.	Immunogenicity of Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) Infection and Ad26.CoV2.S Vaccination in People Living With Human Immunodeficiency Virus (HIV)	2022	Wrong outcome
Khezri, M. R. and Zolbanin, N. M. and Ghasemnejad-Berenji, M. and Jafari, R.	Azithromycin: Immunomodulatory and antiviral properties for SARS-CoV-2 infection	2021	Wrong population
Khokher, W. and Beran, A. and Iftikhar, S. and Malhas, S. E. and Srour, O. and Mhanna, M. and Bhuta, S. and Patel, D. and Kesireddy, N. and Burmeister, C. and Borchers, E. and Assaly, R. and Safi, F.	Pulse versus nonpulse steroid regimens in patients with coronavirus disease 2019: A systematic review and meta-analysis	2022	Wrong population
Kjeldsen, S. and Nielsen, J. and Mertz NÃ¸rgÃ¥rd, B. and Kjeldsen, J.	Mesalazine in Inflammatory Bowel Disease and COVID-19: Hospitalization and Adverse In-Hospital Outcomes Based on Nationwide Data	2022	Paediatric data
Koc, S. and Hanikoglu, F. and Dokur, M. and Polat, Y. and Celebi, S. and Koc, S. G. and Kupeli, I. and Uysal, H.	Comparison of Cytokine Hemadsorption as an Immunomodulator Therapy in COVID-19 Patients with and without Bacterial Sepsis	2022	Wrong population
Korsukewitz, C. and Reddel, S. W. and Bar-Or, A. and Wiendl, H.	Neurological immunotherapy in the era of COVID-19 - looking for consensus in the literature	2020	Wrong population
Koti, M. and Morales, A. and Graham, C. H. and Siemens, D. R.	BCG vaccine and COVID-19: implications for infection prophylaxis and cancer immunotherapy	2020	Wrong population
Kowalska, J. D. and BieÅ„kowski, C. and Fleischhans, L. and Antoniak, S. and Skrzat-KlapaczyÅ„ska, A. and Suchacz, M. and Bogdanic, N. and Gokengin, D. and Oprea, C. and Karpov, I. and Kase, K. and Matulionyte, R. and Papadopoulos, A. and Rukhadze, N. and Harxhi, A. and Jilich, D. and Lakatos, B. and Sedlacek, D. and Dragovic, G. and Vasylyev, M. and Verhaz, A. and Yancheva, N. and Begovac, J. and Horban, A.	The Presence of Either Typical or Atypical Radiological Changes Predicts Poor COVID-19 Outcomes in HIV-Positive Patients from a Multinational Observational Study: Data from Euroguidelines in Central and Eastern Europe Network Group	2022	Wrong outcome
Kuczaj, A. and Zakliczynski, M. and Przybylowski, P. and Zembala, M. and Hrapkowicz, T.	COVID-19 mortality in patients after orthotopic heart transplantation: A single-center one-year observational study	2021	Single centre

Kulkarni, Padmaj S and Das, Kunal and Agrawal, Nitika and Kala, Mansi and Kh and uri, Rakhee and Parikh, Purvish M	The Interplay between COVID-19 and Cancer: Challenges and Perspectives	2020	Incorrect study design
Kulkarni, S. and Fisk, M. and Kostapanos, M. and Banham-Hall, E. and Bond, S. and Hernan-Sancho, E. and Norton, S. and Cheriyan, J. and Cope, A. and Galloway, J. and Hall, F. and Jayne, D. and Wilkinson, I. B.	Repurposed immunomodulatory drugs for Covid-19 in pre-ICu patients - mulTi-Arm Therapeutic study in pre-ICu patients admitted with Covid-19 - Repurposed Drugs (TACTIC-R): A structured summary of a study protocol for a randomised controlled trial	2020	Wrong population
Kumar, A. and Sharma, A. and Tirpude, N. V. and Sharma, S. and Padwad, Y. S. and Kumar, S.	Pharmaco-immunomodulatory interventions for averting cytokine storm-linked disease severity in SARS-CoV-2 infection	2022	Wrong population
Kumar, V.	Toll-like receptors in sepsis-associated cytokine storm and their endogenous negative regulators as future immunomodulatory targets	2020	Wrong population
Kumric, M. and Ticinovic Kurir, T. and Martinovic, D. and Zivkovic, P. M. and Bozic, J.	Impact of the COVID-19 pandemic on inflammatory bowel disease patients: A review of the current evidence	2021	Incorrect study design
Kuno, T. and Miyamoto, Y. and Iwagami, M. and Ishimaru, M. and Takahashi, M. and Egorova, N. N.	The association of remdesivir and in-hospital outcomes for COVID-19 patients treated with steroids	2021	Wrong population
Kuno, T. and Sahashi, Y. and Kawahito, S. and Takahashi, M. and Iwagami, M. and Egorova, N. N.	Prediction of in-hospital mortality with machine learning for COVID-19 patients treated with steroid and remdesivir	2021	Incorrect study design
Kuno, T. and So, M. and Takahashi, M. and Egorova, N. N.	Prophylactic versus therapeutic anticoagulation for survival of patients with COVID-19 on steroid	2022	Wrong outcome
Lafont, E. and Pere, H. and Lebeaux, D. and Cheminet, G. and Thervet, E. and Guillemain, R. and Flahault, A.	Targeted SARS-CoV-2 treatment is associated with decreased mortality in immunocompromised patients with COVID-19	2022	Single centre
Lai, Alvina G and Pasea, Laura and Banerjee, Amitava and Denaxas, Spiros and Katsoulis, Michail and Chang, Wai Hoong and Williams, Bryan and Pillay, Deenan and Noursadeghi, Mahdad and Linch, David	Estimating excess mortality in people with cancer and multimorbidity in the COVID-19 emergency	2020	Compound risk group
Lai, Y. J. and Chang, H. S. and Yang, Y. P. and Lin, T. W. and Lai, W. Y. and Lin, Y. Y. and Chang, C. C.	The role of micronutrient and immunomodulation effect in the vaccine era of COVID-19	2021	Wrong population
Lamouche-Wilquin, P. and Souchard, J. and Pere, M. and Raymond, M. and Asfar, P. and Darreau, C. and Reizine, F. and Hourmant, B. and Colin, G. and Rieul, G. and Kergoat, P. and FrÃ©rou, A. and Lorber, J. and Auchabie, J. and La Combe, B. and Seguin, P. and Egreteau, P. Y. and Morin, J. and Fedun, Y. and Canet, E. and Lascarrou, J. B. and Delbove, A.	Early steroids and ventilator-associated pneumonia in COVID-19-related ARDS	2022	Wrong population
Laracy, J. and Zucker, J. and Castor, D. and McMahon, D. J. and Guo, T. W. and Yan, M. and Shalev, N. and Scherer, M. and Gordon, P. and Sobieszczyk, M. and Yin, M. T.	HIV-1 Infection Does Not Change Disease Course or Inflammatory Pattern of SARS-CoV-2-Infected Patients Presenting at a Large Urban Medical Center in New York City	2021	Single centre
Laurenge, A. and Ursu, R. and Houillier, C. and Abdi, B. and Tebano, G. and Quemeneur, C. and Choquet, S. and Di Blasi, R. and Lozano, F. and Morales, A. and DurÃ¡n-PeÃ±a, A. and Sirven-Villaros, L. and Mathon, B. and Mokhtari, K. and Bielle, F. and Martin-Duverneuil, N. and Delattre, J. Y. and Marcelin, A. G. and Pourcher, V. and Alentorn, A. and Idbaih, A. and Carpentier, A. F. and Leblond, V. and Hoang-Xuan, K. and Touat, M.	SARS-CoV-2 infection in patients with primary central nervous system lymphoma	2021	n<50
Leach, D. A. and Brooke, G. N. and Bevan, C. L.	Roles of steroid receptors in the lung and COVID-19	2021	Insufficient original data
Lee, K. Y. and Rhim, J. W. and Kang, J. H.	Immunopathogenesis of COVID-19 and early immunomodulators	2020	Insufficient original data

Lee, L. and Starkey, T. and Cazier, J. B. and Kerr, R. and Middleton, G.	COVID-19 mortality in hospitalized cancer patients is not significantly affected by chemotherapy or other anti-cancer treatments	2020	Insufficient original data
Li Marzi, V. and Campi, R. and Pecoraro, A. and Greco, I. and Caroti, L. and Cirami, C. L. and Giancane, S. and Lazzeri, C. and Tuccio, A. and Vignolini, G. and Migliaccio, M. L. and Peris, A. and Serni, S.	Feasibility and safety of a kidney transplantation program from donors after brain death during the COVID-19 pandemic: insights from an Italian academic centre	2020	Wrong population
Li, J. P. and Wu, K. H. and Chao, W. R. and Lee, Y. J. and Yang, S. F. and Chao, Y. H.	Immunomodulation of Mesenchymal Stem Cells in Acute Lung Injury: From Preclinical Animal Models to Treatment of Severe COVID-19	2022	Insufficient original data
Lin, H. S. and Lin, X. H. and Wang, J. W. and Wen, D. N. and Xiang, J. and Fan, Y. Q. and Li, H. D. and Wu, J. and Lin, Y. and Lin, Y. L. and Sun, X. R. and Chen, Y. F. and Chen, C. J. and Lian, N. F. and Xie, H. S. and Lin, S. H. and Xie, Q. F. and Li, C. W. and Peng, F. Z. and Wang, N. and Lin, J. Q. and Chen, W. J. and Huang, C. L. and Fu, Y.	Exhausting T Cells During HIV Infection May Improve the Prognosis of Patients with COVID-19	2021	Wrong population
Lin, H. Y.	The severe COVID-19: A sepsis induced by viral infection? And its immunomodulatory therapy	2020	Wrong population
Linares, L. and Cofan, F. and Diekmann, F. and Herrera, S. and Marcos, M. A. and Castel, M. A. and Farrero, M. and Colmenero, J. and Ruiz, P. and Crespo, G. and Llopis, J. and Garcia-Vidal, C. and Soriano, A. and Moreno, A. and Bodro, M. and Albiac, L. and Aguero, D. and Ambrosioni, J. and Blanco, J. L. and Cardozo, C. and Chumbita, M. and De La Mora, L. and Garcia-Alcaide, F. and Garcia-Pouton, N. and Gonzalez-Cordon, A. and Hern and ez-Meneses, M. and Inciarte, A. and Laguno, M. and Leal, L. and MacAya, I. and Mallolas, J. and Martinez, E. and Martinez, M. and Meira, F. and Miro, J. M. and Mensa, J. and Moreno-Martinez, A. and Moreno-Garcia, E. and Morata, L. and Martinez, J. A. and Puerta-Alcalde, P. and Rico, V. and Rojas, J. and Sola, M. and Torres, B. and Torres, M. and Garcia, A. and Perez-Villa, F. and Navasa, M. and Bayes, B. and Cucchiari, D. and Esforzado, N. and Guillen, E. and Molina, A. and Montagud-Marrahi, E. and Oppenheimer, F. and Pineiro, G. J. and Poch, E. and Revuelta, I. and Rodas, L. and Torregrosa, J. V. and Ugalde-Altamirano, J. and Ventura-Aguiar, P. and Hurtado, J. C. and Fern and ez, M. and Mosquera, M. M.	A propensity score-matched analysis of mortality in solid organ transplant patients with COVID-19 compared to non-solid organ transplant patients	2021	n<50
Ling, K. L. and Hilmi, I. and Raja Ali, R. A. and Leong, R. W. L. and Leung, W. K. and Ng, S. C. and Wu, K. C. and Chen, M. H. and Ran, Z. H. and Hisamatsu, T. and Ahuja, V. and Makharia, G. K. and Banerjee, R. and Wei, S. C. and Wu, D. C. and Pisespongsa, P. and Ye, B. D. and Sollano, J. and Simadibrata, M. and Chuah, S. W. and Ooi, C. J.	Asian Pacific Association of Gastroenterology (APAGE) Inflammatory Bowel Disease (IBD) Working Party guidelines on IBD management during the COVID-19 pandemic	2020	Insufficient original data
Lipsa, A. and Prabhu, J. S.	Gender disparity in COVID-19: Role of sex steroid hormones	2021	Wrong population
Liu, N. and Jiang, C. and Cai, P. and Shen, Z. and Sun, W. and Xu, H. and Fang, M. and Yao, X. and Zhu, L. and Gao, X. and Fang, J. and Lin, J. and Guo, C. and Qu, K.	Single-cell analysis of COVID-19, sepsis, and HIV infection reveals hyperinflammatory and immunosuppressive signatures in monocytes	2021	Wrong outcome
Liu, Y. and Han, J. and Li, X. and Chen, D. and Zhao, X. and Qiu, Y. and Zhang, L. and Xiao, J. and Li, B. and Zhao, H.	COVID-19 Vaccination in People Living with HIV (PLWH) in China: A Cross Sectional Study of Vaccine Hesitancy, Safety, and Immunogenicity	2021	Wrong outcome
Llamas-Velasco, M. and Ovejero-Merino, E. and Salgado-Boquete, L.	[Obesity - A Risk Factor for Psoriasis and COVID-19]	2021	Incorrect study design
Logan, A. T. and Davis, N. and Delk, I. and Hassett, L. and Olson, S. and Patel, K.	Characterization of Lung Transplant COVID19+ Patients and Mortality Outcomes	2022	n<50

Loke, X. Y. and Imran, S. A. M. and Tye, G. J. and Wan Kamarul Zaman, W. S. and Nordin, F.	Immunomodulation and Regenerative Capacity of MSCs for Long-COVID	2021	Wrong population
Lopez, V. and Casas-Gonzalez, C. and Vazquez, T. and Cabello, M. and Poveda, I. and Hern and ez, D.	Predictors of mortality in kidney transplant patients infected by SARS-CoV-2 in south of Spain	2021	Single centre
Lucchini, Giovanna and Cozma, Elena and Jackson, Aimee and Gilmour, Kimberly and Protheroe, Rachel Elizabeth and Tholouli, Eleni and Wynn, Robert F and Wilson, Keith and Peggs, Karl S and Potter, Victoria	COVID-19 Infection of HSCT Recipients Is Associated with High Mortality but No Detectable Cytokine Storm at Presentation	2021	Paediatric data
Ludvigsson, J. F. and Axelrad, J. and Halfvarson, J. and Khalili, H. and Larsson, E. and Lochhead, P. and Roelstraete, B. and Simon, T. G. and SÃ¶derling, J. and OlÃ©n, O.	Inflammatory bowel disease and risk of severe COVID-19: A nationwide population-based cohort study in Sweden	2021	Paediatric data
Luis, B. M. and Miguel, M. B. and Pedro, D. L. and David, I. P. and Itziar, A. and Ana, G. H. and Enrique, I. J. and MarÃa, L. V. and Noelia, T. F. and Julio CÃ©sar, B. B. and Marta, U. I. and Rodrigo, S. L. and MarÃa, C. B. and AndrÃ©s, L. M. and Javier, M. I. and Juan Pablo, G. M. and Gerardo, H. F. and Carolina, N. F. and Jorge, B. L. and MarÃa, F. R. and Fern and o, C. T. and Sergio, O. E. and Lourdes, F. C. and MarÃa, G. E. and Gregoria, M. L. and Adolfo, S. R. and JosÃ© Antonio, F. R.	Benefits of early aggressive immunomodulatory therapy (tocilizumab and methylprednisolone) in COVID-19: Single center cohort study of 685 patients	2021	Wrong population
Lund, L. C. and Kristensen, K. B. and Reilev, M. and Christensen, S. and Thomsen, R. W. and Christiansen, C. F. and StÃ¸vring, H. and Johansen, N. B. and Brun, N. C. and Hallas, J. and PottegÃ¥rd, A.	Adverse outcomes and mortality in users of non-steroidal anti-inflammatory drugs who tested positive for SARS-CoV-2: A Danish nationwide cohort study	2020	Wrong population
Luque-Paz, D. and Sesques, P. and Wallet, F. and Bachy, E. and Ader, F.	The burden of SARS-CoV-2 in patients receiving chimeric antigen receptor T cell immunotherapy: everything to lose	2022	Insufficient original data
Lustig, G. and Ganga, Y. and Rodel, H. and Tegally, H. and Jackson, L. and Cele, S. and Khan, K. and Jule, Z. and Reedoy, K. and Karim, F. and Bernstein, M. and Moosa, M. S. and Archary, D. and de Oliveira, T. and Lessells, R. and Abdool Karim, S. S. and Sigal, A.	SARS-CoV-2 evolves increased infection elicited cell death and fusion in an immunosuppressed individual	2022	Insufficient original data
Luzzati, R. and De Luca, M. and Sanson, G. and Borelli, M. and Biolo, G. and Giacomazzi, D. and Zerbato, V. and Di Bella, S.	Potential of outpatient steroid therapy in elderly patients with early COVID-19	2022	Wrong population
Lyons-Weiler, J.	Pathogenic priming likely contributes to serious and critical illness and mortality in COVID-19 via autoimmunity	2020	Wrong population
M and ala, W. L. and Liu, M. K. P.	SARS-CoV-2 and HIV-1: Should HIV-1-Infected Individuals in Sub-Saharan Africa Be Considered a Priority Group for the COVID-19 Vaccines?	2021	Wrong population
Maddox, J.	Risk Factors and Outcomes of Patients with Haematological Malignancy and Covid-19: Ongoing Reduction in Mortality during the 3rd Wave of the Pandemic	2022	Insufficient original data
Madhi, S. A. and Moodley, D. and Hanley, S. and Archary, M. and Hoosain, Z. and Lalloo, U. and Louw, C. and Fairlie, L. and Fouche, L. F. and Masilela, M. S. L. and Singh, N. and Grobbelaar, C. and Ahmed, K. and BenadÃ©, G. and Bhikha, S. and Bhorat, A. E. and Bhorat, Q. and Joseph, N. and Dheda, K. and Esmail, A. and Foulkes, S. and Goga, A. and Oommen Jose, A. and Kruger, G. and Kalonji, D. J. and Lalloo, N. and Lombaard, J. J. and Lombard Koen, A. and Kany Luabeya, A. and Mngqibisa, R. and Petrick, F. G. and Pitsi, A. and Tameris, M. and Thombrayil, A. and Vollgraaff, P. L. and Cloney-Clark, S. and Zhu, M. and Bennett, C. and Albert, G. and Faust, E. and Plested, J. S. and Fries, L. and Robertson, A. and Neal, S. and Cho, I. and Glenn, G. M. and Shinde, V.	Immunogenicity and safety of a SARS-CoV-2 recombinant spike protein nanoparticle vaccine in people living with and without HIV-1 infection: a randomised, controlled, phase 2A/2B trial	2022	Wrong outcome

Madzima, B. and Makoni, T. and Mugurungi, O. and Mudariki, G. and Mpofu, A. and Dube, F. and Munangaidzwa, L. and Taramusi, I.	The impact of the COVID-19 pandemic on people living with HIV in Zimbabwe	2022	Insufficient original data
Maggi, P. and Ricci, E. and Messina, V. and Salzillo, A. and Simeone, F. and Iodice, A. and Socio, G. V.	Dangerous liaisons? The role of inflammation and comorbidities in HIV and SARS-CoV-2 infection	2021	Incorrect study design
Maggiolo, F. and Zoboli, F. and Arosio, M. and Valenti, D. and Guarneri, D. and Sangiorgio, L. and Ripamonti, D. and Callegaro, A.	SARS-CoV-2 infection in persons living with HIV: A single center prospective cohort	2021	Insufficient original data
Maggiore, U. and Riella, L. V. and Azzi, J. and Cravedi, P.	Mortality in solid organ transplant recipients with COVID-19: More than meets the eye	2021	Wrong population
Mahale, N. and Rajhans, P. and Godavarthy, P. and Narasimhan, V. L. and Oak, G. and Marreddy, S. and Bedekar, A. and Dhundi, U. and Pawar, H. S. and Akole, P. and Pawar, B. and Bhurke, B. and Chavan, S. and Prayag, P. and Pur and are, B. and Dalvi, P. and Telbhare, V. and Marudwar, P. and Diwane, D. and Shahane, M. and Prayag, A. and Gugale, S. and Bhor, S. and Jog, S.	A Retrospective Observational Study of Hypoxic COVID-19 Patients Treated with Immunomodulatory Drugs in a Tertiary Care Hospital	2020	Wrong population
Mahalingasivam, Viyaasan and Craik, Alison and Tomlinson, Laurie A and Ge, Long and Hou, Liangying and Wang, Qi and Yang, Kehu and Fogarty, Damian G and Keenan, Ciara	A systematic review of COVID-19 and kidney transplantation	2021	Insufficient original data
Mahase, E.	Covid-19: Low dose steroid cuts death in ventilated patients by one third, trial finds	2020	Wrong population
Mahendraraj, K. and Kim, I. and Todo, T. and Brennan, T. and Nissen, N. and Kosari, K. and Voidonikolas, G. and Ramzy, D.	Mortality from fulminant myocarditis in multi-organ transplant recipient with COVID-19	2021	n<50
Mahooti, M. and Miri, S. M. and Abdolalipour, E. and Ghaemi, A.	The immunomodulatory effects of probiotics on respiratory viral infections: A hint for COVID-19 treatment?	2020	Wrong population
Malek, Alex and re E and Adachi, Javier A and Mulanovich, Victor E and Sassine, Joseph and Raad, Issam I and McConn, Kelly and Seiler, Garret T and Dhal, Udit and Khawaja, Fareed and Chemaly, Roy F	Immune reconstitution and severity of COVID-19 among hematopoietic cell transplant recipients	2021	n<50
Mallis, P. and Michalopoulos, E. and Chatzistamatiou, T. and Stavropoulos-Giokas, C.	Mesenchymal stromal cells as potential immunomodulatory players in severe acute respiratory distress syndrome induced by SARS-CoV-2 infection	2020	Wrong population
Mamode, Nizam and Ahmed, Zubir and Jones, Gareth and Banga, Neal and Motallebzadeh, Reza and Tolley, Hannah and Marks, Steve and Stojanovic, Jelena and Khurram, Muhammad A and Thuraisingham, Raj	Mortality rates in transplant recipients and transplantation candidates in a high-prevalence COVID-19 environment	2021	Paediatric data
Manganiello, C. F. and Basbus, L. and Callegari, M. S. and Cayol, F. and Amaral De Sousa, C. R. and Porta, R. E.	[Immunotherapy with anti-SARS-COV-2 neutralizing F(ab')2 antibodies from equine serum in the treatment of outpatients with bilateral COVID-19 pneumonia]	2022	Wrong population
Manna, S. and Chowdhury, T. and Chakraborty, R. and M and al, S. M.	Probiotics-Derived Peptides and Their Immunomodulatory Molecules Can Play a Preventive Role Against Viral Diseases Including COVID-19	2021	Wrong population
MarÃn-JimÃ©nez, I. and Zabana, Y. and RodrÃguez-Lago, I. and MarÃn, L. and Barreiro-de Acosta, M. and Esteve, M.	COVID-19 and inflammatory bowel disease: questions arising from patient care and follow-up during the initial phase of the pandemic (February-April 2020)	2020	Wrong outcome
Market, M. and Angka, L. and Martel, A. B. and Bastin, D. and Olanubi, O. and Tennakoon, G. and Boucher, D. M. and Ng, J. and Ardolino, M. and Auer, R. C.	Flattening the COVID-19 Curve With Natural Killer Cell Based Immunotherapies	2020	Wrong population
Martinez-Lopez, J and Hern and ez-Ibarburu, G and Alonso, R and Sanchez-Pina, JM and Zamanillo, I and Lopez-MuÃ±oz, N and lÃ±iguez, Rodrigo and Cuellar, C and Calbacho, M and Paciello, ML	Impact of COVID-19 in patients with multiple myeloma based on a global data network	2021	Indirect mortality

Martinez-Urbistondo, M. and Gutierrez-Rojas, A. and Andres, A. and Gutierrez, I. and Escudero, G. and Garcia, S. and Gutierrez, A. and Sanchez, E. and Herraiz, J. and De La Fuente, S. and Callejas, A. and De Mendoza, C. and Moreno-Torres, V.	Severe Lymphopenia as a Predictor of COVID-19 Mortality in Immunosuppressed Patients	2021	Wrong population
Mashinchi, B. and Aryannejad, A. and Namazi, M. and Moradi, S. and Masoumi, Z. and Parsaei, A. and Masoumi, M.	A Case of C-ANCA Positive Systematic Lupus Erythematous and ANCA-Associated Vasculitis Overlap Syndrome Superimposed by COVID-19: A Fatal Trio	2021	n<50
Mason, A. and Anver, H. and Lwin, M. and Holroyd, C. and Faust, S. N. and Edwards, C. J.	Lupus, vaccinations and COVID-19: What we know now	2021	Incorrect study design
Mason, A. and Rose, E. and Edwards, C. J.	Clinical management of Lupus patients during the COVID-19 pandemic	2020	Wrong outcome
Massarvva, T.	Clinical outcomes of COVID-19 amongst HIV patients: a systematic literature review	2021	Paediatric data
Matsuda, E. M. and Oliveira, I. P. and Campos, I. B. and Ahagon, C. M. and Castejon, M. J. and Silva, V. O. and Manzoni, F. M. and LÃ³pez-Lopes, G. I. and BrÃgido, L. F. M.	SARS-CoV-2 testing among patients and healthcare professionals in an HIV outpatient clinic in Brazil	2022	Wrong outcome
Matucci-Cerinic, M. and Bruni, C. and Allanore, Y. and Clementi, M. and Dagna, L. and Damjanov, N. S. and de Paulis, A. and Denton, C. P. and Distler, O. and Fox, D. and Furst, D. E. and Khanna, D. and Krieg, T. and Kuwana, M. and Lee, E. B. and Li, M. and Pillai, S. and Wang, Y. and Zeng, X. and Taliani, G.	Systemic sclerosis and the COVID-19 pandemic: World Scleroderma Foundation preliminary advice for patient management	2020	Incorrect study design
Mauvais-Jarvis, F. and Klein, S. L. and Levin, E. R.	Estradiol, Progesterone, Immunomodulation, and COVID-19 Outcomes	2020	Incorrect study design
Mazzitelli, M. and Trunfio, M. and Sasset, L. and Leoni, D. and Castelli, E. and Lo Menzo, S. and Gardin, S. and Putaggio, C. and Brundu, M. and Garzotto, P. and Cattelan, A. M.	Factors Associated with Severe COVID-19 and Post-Acute COVID-19 Syndrome in a Cohort of People Living with HIV on Antiretroviral Treatment and with Undetectable HIV RNA	2022	Wrong outcome
McAllister, M. J. and Kirkwood, K. and Chuah, S. C. and Thompson, E. J. and Cartwright, J. A. and Russell, C. D. and Dorward, D. A. and Lucas, C. D. and Ho, G. T.	Intestinal Protein Characterisation of SARS-CoV-2 Entry Molecules ACE2 and TMPRSS2 in Inflammatory Bowel Disease (IBD) and Fatal COVID-19 Infection	2022	Wrong outcome
Mehta, P. and Gasparyan, A. Y. and Zimba, O. and Kitas, G. D.	Systemic lupus erythematosus in the light of the COVID-19 pandemic: infection, vaccination, and impact on disease management	2022	Insufficient original data
Mehta, S. A. and Rana, M. M. and Motter, J. D. and Small, C. B. and Pereira, M. R. and Stosor, V. and Elias, N. and Haydel, B. and Florman, S. and Odim, J. and Morsheimer, M. and Robien, M. and Massie, A. B. and Brown, D. and Boyarsky, B. J. and Garonzik-Wang, J. and Tobian, A. A. R. and Werbel, W. A. and Segev, D. L. and Dur and , C. M.	Incidence and Outcomes of COVID-19 in Kidney and Liver Transplant Recipients With HIV: Report From the National HOPE in Action Consortium	2021	n<50
MelgaÃ§o, J. G. and Brito, E. Cunha D. and Azamor, T. and da Silva, A. M. V. and TubarÃ£o, L. N. and GonÃ§alves, R. B. and Monteiro, R. Q. and Missailidis, S. and da Costa Neves, P. C. and Ano Bom, A. P. D.	Cellular and Molecular Immunology Approaches for the Development of Immunotherapies against the New Coronavirus (SARS-CoV-2): Challenges to Near-Future Breakthroughs	2020	Wrong outcome
Mendoza, Maria A and Raja, Mohammed and Villavicencio, Aasith and Anjan, Shweta and Natori, Yoichiro	Is the outcome of SARS-CoV-2 infection in solid organ transplant recipients really similar to that of the general population?	2020	Insufficient original data
Messika, Jonathan and Eloy, Philippine and Roux, Antoine and Hirschi, S and rine and Nieves, Ana and Le Pavec, JÃ©rÃ´me and SÃ©nÃ©chal, Agathe and Saint Raymond, Christel and Carlier, Nicolas and Demant, Xavier	COVID-19 in lung transplant recipients	2021	Insufficient original data
Meyerowitz, E. A. and Sen, P. and Schoenfeld, S. R. and Neilan, T. G. and Frigault, M. J. and Stone, J. H. and Kim, A. Y. and Mansour, M. K.	Immunomodulation as Treatment for Severe Coronavirus Disease 2019: A Systematic Review of Current Modalities and Future Directions	2021	Wrong population

Midha, I. K. and Kumar, N. and Kumar, A. and Madan, T.	Mega doses of retinol: A possible immunomodulation in Covid-19 illness in resource-limited settings	2021	Wrong population
Mihalopoulos, M. and Levine, A. C. and Marayati, N. F. and Chubak, B. M. and Archer, M. and Badani, K. K. and Tewari, A. K. and Mohamed, N. and Ferrer, F. and Kyprianou, N.	The Resilient Child: Sex-Steroid Hormones and COVID-19 Incidence in Pediatric Patients	2020	Wrong population
Mikulska, M. and Nicolini, L. A. and Signori, A. and Di Biagio, A. and Sepulcri, C. and Russo, C. and Dettori, S. and Berruti, M. and Sormani, M. P. and Giacobbe, D. R. and Vena, A. and De Maria, A. and Dentone, C. and Taramasso, L. and Mirabella, M. and Magnasco, L. and Mora, S. and Delfino, E. and Toscanini, F. and Balletto, E. and Aless and rini, A. I. and Baldi, F. and Briano, F. and Camera, M. and Dodi, F. and Ferrazin, A. and Labate, L. and Mazzarello, G. and Pincino, R. and Portunato, F. and Tutino, S. and Barisione, E. and Bruzzone, B. and Orsi, A. and Schenone, E. and Rosseti, N. and Sasso, E. and Da Rin, G. and Pelosi, P. and Beltramini, S. and Giacomini, M. and Icardi, G. and Gratarola, A. and Bassetti, M.	Tocilizumab and steroid treatment in patients with COVID-19 pneumonia	2020	Wrong population
Milic, J. and Novella, A. and Meschiari, M. and Menozzi, M. and Santoro, A. and Bedini, A. and Cuomo, G. and Franceschini, E. and Digaetano, M. and Carli, F. and Ciusa, G. and Volpi, S. and Bacca, E. and Franceschi, G. and Yaacoub, D. and Rogati, C. and Tutone, M. and Burastero, G. and Faltoni, M. and Iadisernia, V. and Dolci, G. and Cossarizza, A. and Mussini, C. and Pasina, L. and Guaraldi, G.	Darunavir/Cobicistat Is Associated with Negative Outcomes in HIV-Negative Patients with Severe COVID-19 Pneumonia	2021	Wrong outcome
Minkove, S. J. and Geiger, G. and Llibre, J. M. and Montgomery, M. W. and West, N. E. and Chida, N. M. and Antar, A. A. R. and D and achi, D. and Weld, E. D.	Clinical outcomes after IL-6 blockade in patients with COVID-19 and HIV: a case series	2022	n<50
Mir and a, M. N. S. and Pingarilho, M. and Pimentel, V. and Torneri, A. and Seabra, S. G. and Libin, P. J. K. and Abecasis, A. B.	A Tale of Three Recent Pandemics: Influenza, HIV and SARS-CoV-2	2022	Insufficient original data
Mirouse, A. and Darmon, M. and Zafrani, L. and Lengline, E. and Azoulay, E.	Impact of immunosuppression on mortality in critically ill COVID-19 patients	2020	Single centre
Mitchell, K. M. and Dimitrov, D. and Silhol, R. and Geidelberg, L. and Moore, M. and Liu, A. and Beyrer, C. and Mayer, K. H. and Baral, S. and Boily, M. C.	Estimating the potential impact of COVID-19-related disruptions on HIV incidence and mortality among men who have sex with men in the United States: a modelling study	2020	Wrong outcome
Mitchell, K. M. and Dimitrov, D. and Silhol, R. and Geidelberg, L. and Moore, M. and Liu, A. and Beyrer, C. and Mayer, K. H. and Baral, S. and Boily, M. C.	The potential effect of COVID-19-related disruptions on HIV incidence and HIV-related mortality among men who have sex with men in the USA: a modelling study	2021	Wrong outcome
Mohamed Khosroshahi, L. and Rokni, M. and Mokhtari, T. and Noorbakhsh, F.	Immunology, immunopathogenesis and immunotherapeutics of COVID-19; an overview	2021	Insufficient original data
Mohan, A. and Shaikh, M. T. A. and Wara, U. U. and Rackimuthu, S. and Costa, Acds and Lal, P. M. and Ahmad, S. and Essar, M. Y.	HIV/AIDS among children in Ratodero, Pakistan amidst the COVID-19 pandemic: Challenges, efforts, and recommendations	2021	Wrong population
Mohan, S. and King, K. and Husain, S. A. and Schold, J.	COVID-19-Associated Mortality among Kidney Transplant Recipients and Candidates in the United States	2021	Insufficient original data
Mohan, Sumit and King, Kristen and Husain, S Ali and Schold, Jesse	COVID-19Ã¢â‚¬â€œAssociated Mortality among Kidney Transplant Recipients and Candidates in the	2021	Duplicate
Mohanty, R. R. and Biswa Mohan, Padhy and Meher, B. R.	Effectiveness of pulse dose methyl prednisolone in management of COVID 19: A systematic review and meta-analysis of observational studies	2022	Wrong population
Mohanty, R. R. and Das, S. and Padhy, B. M. and Meher, B. R.	Comparison of Clinical Outcome between Dexamethasone and Methyl Prednisolone in Treatment of Moderate to Severe COVID-19: A	2022	Wrong population

	Systematic Review and Meta-Analysis		
Mohr-Holl and , E. and Daniels, J. and Douglas-Jones, B. and Mema, N. and Scott, V. and Trivino-Duran, L. and Pfaff, C. and Furin, J. and Isaakidis, P.	A positive COVID-19 test is associated with high mortality in RR-TB-HIV patients	2021	Compound risk group
Monteiro, M. A. and Prates, G. S. and AP, R. Veiga and Magri, M. M. C. and Gascon, M. R. P. and Ferreira, M. D. and Tiberto, L. and Pereira, L. O. and de Lima Nascimento, N. A. and Polis, T. J. B. and Alves, W. and Fonseca, L. A. M. and Duarte, A. J. S. and Casseb, J.	SARS-CoV-2/COVID-19: Clinical course among subjects HIV-1-infected in Sao Paulo	2022	n<50
Monteleone, G. and Ardizzone, S.	Are Patients with Inflammatory Bowel Disease at Increased Risk for Covid-19 Infection?	2020	Incorrect study design
Montero, Fern and o and MartÃnez-Barrio, Julia and Serrano-Benavente, BelÃ©n and GonzÃ¡lez, Teresa and Rivera, Javier and Molina Collada, Juan and CastrejÃ³n, Isabel and Ã□lvaro-Gracia, Jose	Coronavirus disease 2019 (COVID-19) in autoimmune and inflammatory conditions: clinical characteristics of poor outcomes	2020	Single centre
Moosazadeh, M. and Mousavi, T.	Combination therapy of tocilizumab and steroid for COVID-19 patients: A meta-analysis	2022	Wrong population
Morani, Z. and Patel, S. and Ghosh, S. and Hassan, F. A. and Doreswamy, S. and Singh, S. and Kothapudi, V. N. and Desai, R.	COVID-19 in HIV: a Review of Published Case Reports	2020	n<50
Moreno, A. and Vargas, C. and Azocar, F. and Villarroel, F. and CofrÃ©, M. and Oppliger, H. and RÃos, F. and Raijmakers, M. and Silva-Ayarza, I. and BeltrÃ¡n, C. and Zamora, F.	Steroids and mortality in non-critically ill COVID-19 patients: a propensity score-weighted study in a Chilean cohort	2021	Immunosuppressio n as treatment
Mugisa, B. and Sabry, A. and Hutin, Y. and Hermez, J.	HIV epidemiology in the WHO Eastern Mediterranean region: a multicountry programme review	2022	Incorrect study design
Mukherjee, A. P.	Hypothesis: Immunotherapy by Selective Convalescent Blood Engineering to Stifle Diseases like COVID-19	2021	Wrong population
Munch, M. W. and Granholm, A. and Kjaer, M. N. and Aksnes, T. S. and SÃ¸lling, C. G. and Christensen, S. and Perner, A.	Long-term mortality and health-related quality of life in the COVID STEROID trial	2022	Immunosuppressio n as treatment
Munch, M. W. and Granholm, A. and Myatra, S. N. and Vijayaraghavan, B. and Cronhjort, M. and Wahlin, R. R. and Jakob, S. M. and Cioccari, L. and Kjaer, M. N. and Vesterlund, G. K. and Meyhoff, T. S. and Helleberg, M. and MÃ¸ller, M. H. and Benfield, T. and Venkatesh, B. and Hammond, N. and Micallef, S. and Bassi, A. and John, O. and Jha, V. and Kristiansen, K. T. and Ulrik, C. S. and JÃ¸rgensen, V. L. and Smitt, M. and Bestle, M. H. and Andreasen, A. S. and Poulsen, L. M. and Rasmussen, B. S. and BrÃ¸chner, A. C. and StrÃ¸m, T. and MÃ¸ller, A. and Khan, M. S. and Padmanaban, A. and Divatia, J. V. and Saseedharan, S. and Borawake, K. and Kapadia, F. and Dixit, S. and Chawla, R. and Shukla, U. and Amin, P. and Chew, M. S. and Gluud, C. and Lange, T. and Perner, A.	Higher vs lower doses of dexamethasone in patients with COVID-19 and severe hypoxia (COVID STEROID 2) trial: Protocol and statistical analysis plan	2021	Wrong population
Munch, M. W. and Meyhoff, T. S. and Helleberg, M. and Kjaer, M. N. and Granholm, A. and HjortsÃ¸, C. J. S. and Jensen, T. S. and MÃ¸ller, M. H. and Hjortrup, P. B. and Wetterslev, M. and Vesterlund, G. K. and Russell, L. and JÃ¸rgensen, V. L. and Kristiansen, K. T. and Benfield, T. and Ulrik, C. S. and Andreasen, A. S. and Bestle, M. H. and Poulsen, L. M. and Hildebr and t, T. and Knudsen, L. S. and MÃ¸ller, A. and SÃ¸lling, C. G. and BrÃ¸chner, A. C. and Rasmussen, B. S. and Nielsen, H. and Christensen, S. and StrÃ¸m, T. and Cronhjort, M. and Wahlin, R. R. and Jakob, S. M. and Cioccari, L. and Venkatesh, B. and Hammond, N. and Jha, V. and Myatra, S. N. and Jensen, M. Q. and Leistner, J. W. and Mikkelsen, V. S. and Svenningsen, J. S. and Laursen, S. B. and	Low-dose hydrocortisone in patients with COVID-19 and severe hypoxia: The COVID STEROID randomised, placebo-controlled trial	2021	Wrong population

Hatley, E. V. and Kristensen, C. M. and Al-Alak, A. and Clapp, E. and Jonassen, T. B. and Bjerregaard, C. L. and Ã˜sterby, N. C. H. and Jespersen, M. M. and Abou-Kassem, D. and Lassen, M. L. and Zaabalawi, R. and Daoud, M. M. and Abdi, S. and Meier, N. and la Cour, K. and Derby, C. B. and Damlund, B. R. and Laigaard, J. and Andersen, L. L. and Mikkelsen, J. and Jensen, J. L. S. and Rasmussen, A. H. and ArnerlÃ¶v, E. and Lykke, M. and Holst-Hansen, M. Z. B. and TÃ¸stesen, B. W. and Schwab, J. and Madsen, E. K. and Gluud, C. and Lange, T. and Perner, A.			
Munch, M. W. and Myatra, S. N. and Vijayaraghavan, B. K. T. and Saseedharan, S. and Benfield, T. and Wahlin, R. R. and Rasmussen, B. S. and Andreasen, A. S. and Poulsen, L. M. and Cioccari, L. and Khan, M. S. and Kapadia, F. and Divatia, J. V. and BrÃ¸chner, A. C. and Bestle, M. H. and Helleberg, M. and Michelsen, J. and Padmanaban, A. and Bose, N. and MÃ¸ller, A. and Borawake, K. and Kristiansen, K. T. and Shukla, U. and Chew, M. S. and Dixit, S. and Ulrik, C. S. and Amin, P. R. and Chawla, R. and Wamberg, C. A. and Shah, M. S. and Darfelt, I. S. and JÃ¸rgensen, V. L. and Smitt, M. and Granholm, A. and KjÃ¦r, M. N. and MÃ¸ller, M. H. and Meyhoff, T. S. and Vesterlund, G. K. and Hammond, N. E. and Micallef, S. and Bassi, A. and John, O. and Jha, A. and Cronhjort, M. and Jakob, S. M. and Gluud, C. and Lange, T. and Kadam, V. and Marcussen, K. V. and Hollenberg, J. and Hedman, A. and Nielsen, H. and SchjÃ¸rring, O. L. and Jensen, M. Q. and Leistner, J. W. and Jonassen, T. B. and Kristensen, C. M. and Clapp, E. C. and HjortsÃ¸, C. J. S. and Jensen, T. S. and Halstad, L. S. and Bak, E. R. B. and Zaabalawi, R. and Metcalf-Clausen, M. and Abdi, S. and Hatley, E. V. and Aksnes, T. S. and Gleipner-Andersen, E. and AlarcÃ³n, A. F. and Yamin, G. and Heymowski, A. and Berggren, A. and La Cour, K. and Weihe, S. and Pind, A. H. and EngstrÃ¸m, J. and Jha, V. and Venkatesh, B. and Perner, A.	Effect of 12 mg vs 6 mg of Dexamethasone on the Number of Days Alive Without Life Support in Adults With COVID-19 and Severe Hypoxemia: The COVID STEROID 2 Randomized Trial	2021	Wrong population
Murali, A. and Wong, P. and Gilbar, P. J. and Mangos, H. M.	Acquired Hemophilia A following Pfizer-BioNTech SARS CoV-2 mRNA vaccine, successfully treated with prednisolone and rituximab	2022	Wrong outcome
Murali, M. and Gowtham, H. G. and Ansari, M. A. and Alomary, M. N. and Alghamdi, S. and Almehmadi, M. and Singh, S. B. and Shilpa, N. and Aiyaz, M. and Kalegowda, N. and Ledesma, A. E. and Amruthesh, K. N.	Repositioning Therapeutics for SARS-CoV-2: Virtual Screening of Plant-based Anti-HIV Compounds as Possible Inhibitors against COVID-19 Viral RdRp	2022	Wrong population
Murphy, E. J. and Masterson, C. and Rezoagli, E. and O'Toole, D. and Major, I. and Stack, G. D. and Lynch, M. and Laffey, J. G. and Rowan, N. J.	Î²-Glucan extracts from the same edible shiitake mushroom Lentinus edodes produce differential in-vitro immunomodulatory and pulmonary cytoprotective effects - Implications for coronavirus disease (COVID-19) immunotherapies	2020	Wrong population
Murphy, L.	Systemic lupus erythematosus: overview, management and COVID-19	2022	Insufficient original data
Murthy, S. K. and Kuenzig, M. E. and Windsor, J. W. and Ghia, J. E. and Griffiths, A. M. and Panaccione, R. and Seow, C. H. and Benchimol, E. I. and Bernstein, C. N. and Bitton, A. and Huang, J. G. and Jones, J. L. and Lee, K. and Kaplan, G. G. and Mukhtar, M. S. and T and on, P. and Targownik, L. E. and Gibson, D. L.	Crohn's and Colitis Canada's 2021 Impact of COVID-19 and Inflammatory Bowel Disease in Canada: COVID-19 Vaccines-Biology, Current Evidence and Recommendations	2021	Incorrect study design
Myers, Catherine N and Scott, John Harwood and Criner, Gerard J and Cordova, Francis C and Mamary, Albert James and Marchetti, Nathaniel and Shenoy, Kartik V and Galli,	COVID-19 in lung transplant recipients	2020	Insufficient original data

Jonathan A and Mulhall, Patrick D and Brown, James C			
Myers, L. C. and Murray, R. K. and Donato, B. M. K. and Liu, V. X. and Kipnis, P. and Kipnis, P. and Shaikh, A. and Franchino-Elder, J.	Persistent Steroid Exposure Before Coronavirus Disease 2019 Diagnosis and Risk of Hospitalization in Patients With Chronic Obstructive Pulmonary Disease	2022	Wrong population
Nachega, J. B. and Kapata, N. and Sam-Agudu, N. A. and Decloedt, E. H. and Katoto, Pdmc and Nagu, T. and Mwaba, P. and Yeboah-Manu, D. and Ch and a-Kapata, P. and Ntoumi, F. and Geng, E. H. and Zumla, A.	Minimizing the impact of the triple burden of COVID-19, tuberculosis and HIV on health services in sub-Saharan Africa	2021	Compound risk group
Nacif, Lucas Souto and Zanini, Leonardo Y and Waisberg, Daniel R and Pinheiro, Rafael S and GalvÃ£o, FlÃ¡vio and Andraus, Wellington and D'Albuquerque, Luiz Carneiro	COVID-19 in solid organ transplantation patients: A systematic review	2020	n<50
Nagai, H. and Saito, M. and Adachi, E. and Sakai-Tagawa, Y. and Yamayoshi, S. and Kiso, M. and Kawamata, T. and Koga, M. and Kawaoka, Y. and Tsutsumi, T. and Yotsuyanagi, H.	Casirivimab/Imdevimab for Active COVID-19 Pneumonia Which Persisted for Nine Months in a Patient with Follicular Lymphoma during Anti-CD20 Therapy	2022	n<50
Nagarakanti, S. R. and Okoh, A. K. and Grinberg, S. and Bishburg, E.	Clinical outcomes of patients with COVID-19 and HIV coinfection	2021	n<50
Naidoo, N. and Moodley, J. and Naicker, T.	Maternal endothelial dysfunction in HIV-associated preeclampsia comorbid with COVID-19: a review	2021	Wrong population
Nair, K. and Mallick, S. and Veerankutty, F. and Yadav, A. and Srinivas Reddy, M. and Jamir, I. and Chaudhary, A. and Wadhawan, M. and Saraf, N. and Singh Soin, A. and Surendran, S.	COVID-19 in liver transplant recipients portend high mortality: A multicentric Indian experience	2022	Insufficient original data
Nair, V. and J and ovitz, N. and Abate, M. and Nair, G. D. and Bhaskaran, M. C. and Molmenti, E. P.	Risk factors for mortality in kidney transplant recipients with COVID-19	2020	n<50
Nair, Vinay and J and ovitz, Nicholas and Jhaveri, Kenar D and Molmenti, Ernesto	COVID-19 and solid organ transplant outcomes	2020	Insufficient original data
Nalubega, S. and Kyenkya, J. and Bagaya, I. and Nabukenya, S. and Ssewankambo, N. and Nakanjako, D. and Kiragga, A. N.	COVID-19 may exacerbate the clinical, structural and psychological barriers to retention in care among women living with HIV in rural and peri-urban settings in Uganda	2021	Wrong outcome
Narain, S. and Stefanov, D. G. and Chau, A. S. and Weber, A. G. and Marder, G. and Kaplan, B. and Malhotra, P. and Bloom, O. and Liu, A. and Lesser, M. L. and Hajizadeh, N.	Comparative Survival Analysis of Immunomodulatory Therapy for Coronavirus Disease 2019 Cytokine Storm	2021	Wrong population
Nargesi, S. and Bongomin, F. and Hedayati, M. T.	The impact of COVID-19 pandemic on AIDS-related mycoses and fungal neglected tropical diseases: Why should we worry?	2021	Wrong population
Naser Moghadasi, A. and Shabany, M. and Heidari, H. and Esk and arieh, S.	Can pulse steroid therapy increase the risk of infection by COVID-19 in patients with multiple sclerosis?	2021	Wrong population
Nasir, N. and Tajuddin, S. and Khaskheli, S. and Khan, N. and Niamatullah, H. and Nasir, N.	Clinical outcomes of immunomodulatory therapies in the management of COVID-19: A tertiary-care experience from Pakistan	2022	Wrong population
Navari, Y. and Bagheri, A. B. and Akhavan Rezayat, A. and SeyedAlinaghi, S. and Najafi, S. and Barzegary, A. and Asadollahi-Amin, A.	Mortality risk factors in kidney-transplanted patients with COVID-19: A systematic review and regression analysis	2021	Duplicate
Navari, Y. and Bagheri, A. B. and Akhavan Rezayat, A. and SeyedAlinaghi, S. and Najafi, S. and Barzegary, A. and Asadollahi-Amin, A.	Mortality risk factors in kidney-transplanted patients with COVID-19: A systematic review and regression analysis	2021	Wrong population
Neyens, T.	Did an effect of kidney transplantation on COVID-19 mortality go unnoticed due to selection bias?	2021	Insufficient original data
Ngamprasertchai, T. and Kajeekul, R. and Sivakorn, C. and Ruenroegnboon, N. and Luvira, V. and Siripoon, T. and Luangasanatip, N.	Efficacy and Safety of Immunomodulators in Patients with COVID-19: A Systematic Review and Network Meta-Analysis of Randomized Controlled Trials	2022	Wrong population

Ngouanom Kuate, M. P. and Bongomin, F. and Ndip, R. N.	SARS-CoV-2, HIV, and Mycobacterium tuberculosis triple co-infection	2022	Wrong population
Nguyen, M. T. and Sterris, J. and Woloszyn, J. and Regmi, S. and Rattanavich, R. and Rakoski, M. and Lin, M. and Mehta, P. and Kore, A. and Weissman, J. and Phan, T. and Jerez-Aguilar, B. and Robinson, M. and Wells, E. and Villicana, R. and De Vera, M.	Neutrophil-to-Lymphocyte Ratio at Time of COVID-19 Diagnosis Predicts Severity of Illness and Mortality in Solid Abdominal Organ Transplant Recipients	2022	Single centre
Nguyen, T. V. and Frost, S. A.	Effect of Steroids on Coronavirus Disease 2019 (COVID-19) Mortality Risk: A Bayesian Interpretation	2021	Wrong population
Nielsen, Travis B and Pantapalangkoor, Paul and Luna, Brian and Dekitani, Ken and Bruhn, Kevin and Tan, Br and on and Junus, Justin and Bonomo, Robert A and Schmidt, Ann Marie and Doherty, Terrence M	A Change in Paradigm: Diabetes Exacerbates Infection Severity by Hyperinflammation, Not Immunosuppression	2016	Incorrect date
Nierengarten, Mary Beth	Poor overall survival in bone marrow transplant patients with COVID-19	2021	Incorrect study design
Nln, I. and Fern and ez-Ruiz, R. and Muskardin, T. L. W. and Paredes, J. L. and Blazer, A. D. and Tuminello, S. and Attur, M. and Iturrate, E. and Petrilli, C. M. and Abramson, S. B. and Chakravarti, A. and Niewold, T. B.	Interferon pathway lupus risk alleles modulate risk of death from acute COVID-19	2021	Wrong outcome
Nomah, D. K. and Reyes-UrueÃ±a, J. and DÃaz, Y. and Moreno, S. and Aceiton, J. and Bruguera, A. and Vivanco-Hidalgo, R. M. and Llibre, J. M. and Domingo, P. and FalcÃ³, V. and Imaz, A. and CortÃ©s, C. and Force, L. and Letang, E. and VilarÃ³, I. and Casabona, J. and Miro, J. M.	Sociodemographic, clinical, and immunological factors associated with SARS-CoV-2 diagnosis and severe COVID-19 outcomes in people living with HIV: a retrospective cohort study	2021	Wrong outcome
Obata, R. and Maeda, T. and Rizk, D. and Kuno, T.	Increased Secondary Infection in COVID-19 Patients Treated with Steroids in New York City	2021	Incorrect study design
O'Brien, E. R. and S and hu, J. K.	Sex differences in COVID-19 mortality: opportunity to develop HSP27 (HSPB1) immunotherapy to treat hyper-inflammation?	2020	Wrong population
ObriÈ™cÄƒ, B. and Vornicu, A. and JurubiÈ›Äƒ, R. and Mocanu, V. and Dimofte, G. and Andronesi, A. and Sorohan, B. and Achim, C. and Micu, G. and BobeicÄƒ, R. and Dina, C. and Ismail, G.	Characteristics of SARS-CoV-2 Infection in an Actively Monitored Cohort of Patients with Lupus Nephritis	2022	n<50
Ochoa-Ramirez, L. A. and Ramos-Payan, R. and Jimenez-Gastelum, G. R. and Rodriguez-Millan, J. and Aguilar-Medina, M. and Rios-Tostado, J. J. and Ayala-Ham, A. and Bermudez, M. and Osuna-Ramos, J. F. and Olimon-Andalon, V. and Velarde-Felix, J. S.	The Chemokine MIG is Associated with an Increased Risk of COVID-19 Mortality in Mexican Patients	2022	Wrong population
Ofori-Asenso, Richard and Ogundipe, Oyepeju and Agyeman, Akosua Adom and Chin, Ken Lee and Mazidi, Mohsen and Ademi, Zanfina and De Bruin, Marie Louise and Liew, Danny	Cancer is associated with severe disease in COVID-19 patients: a systematic review and meta-analysis	2020	Wrong outcome
Oh, S. M. and Ham, S. Y. and Suh, H. J. and Lee, E. and Park, S. W.	Clinical Characteristics of COVID-19: Use of Steroids in Mostly Unvaccinated COVID-19 Patients Before the Omicron Variant	2022	Wrong outcome
Okumura, K. and Nishida, S. and Dh and , A.	Trends in COVID-19 Mortality among Solid Organ Transplant Recipients: Implications for Prevention	2022	Wrong outcome
Olivera, M. J.	Dexamethasone and COVID-19: Strategies in Low- and Middle-Income Countries to Tackle Steroid-Related Strongyloides Hyperinfection	2021	Wrong population
Omran, H. M. and Almaliki, M. S.	Influence of NAD+ as an ageing-related immunomodulator on COVID 19 infection: A hypothesis	2020	Wrong population
Ortiz-MartÃnez, Y. and LÃ³pez-LÃ³pez, MÃ and Ruiz-GonzÃ¡lez, C. E. and Turbay-Caballero, V. and Sacoto, D. H. and Caldera-Caballero, M. and Bravo, H. and Sarmiento, J. and Rodriguez-Morales, A. J.	Willingness to receive COVID-19 vaccination in people living with HIV/AIDS from Latin America	2022	Wrong outcome

Osmanodja, B. and Mayrdorfer, M. and Halleck, F. and Choi, M. and Budde, K.	Undoubtedly, kidney transplant recipients have a higher mortality due to COVID-19 disease compared to the general population	2021	Incorrect study design
Ouyang, J. and Bajracharya, S. D. and Yap, E. and Mallappallil, M. C.	Mortality of AKI in human immunodeficiency virus with and without co-infection with COVID-19	2020	Compound risk group
Owaidah, T. and Saleh, M. and Aguilos, A. M. and Amri, A. A. and Maghrabi, K. and Owaidah, M. and Siddiqui, K. and Alsaleh, K. and Alnounou, R.	Incidence of lupus anticoagulant in hospitalized covid-19 patients	2021	Wrong population
PÃ©rez-Ortega, JoaquÃn and Almanza-Ortega, Nelva Nely and Torres-Poveda, Kirvis and MartÃnez-GonzÃ¡lez, Gerardo and Zavala-DÃ-az, JosÃ© CrispÃn and Pazos-Rangel, Rodolfo	Application of Data Science for Cluster Analysis of COVID-19 Mortality According to Sociodemographic Factors at Municipal Level in Mexico	2022	Wrong population
Pahalyants, V. and Murphy, W. S. and Klebanov, N. and Lu, C. and Theodosakis, N. and Klevens, R. M. and Estir, H. and Lilly, E. and Asgari, M. and Semenov, Y. R.	Immunosuppressive biologics did not increase the risk of COVID-19 or subsequent mortality: A retrospective matched cohort study from Massachusetts	2022	Wrong outcome
Parekh, R. and Zhang, X. and Ungaro, R. C. and Brenner, E. J. and Agrawal, M. and Colombel, J. F. and Kappelman, M. D.	Presence of Comorbidities Associated with Severe Coronavirus Infection in Patients with Inflammatory Bowel Disease	2022	Compound risk group
Park, D. E. and Higdon, M. M. and Prosperi, C. and Baggett, H. C. and Brooks, W. A. and Feikin, D. R. and Hammitt, L. L. and Howie, S. R. C. and Kotloff, K. L. and Levine, O. S. and Madhi, S. A. and Murdoch, D. R. and O'Brien, K. L. and Scott, J. A. G. and Thea, D. M. and Antonio, M. and Awori, J. O. and Baillie, V. L. and Bunthi, C. and Kwenda, G. and Mackenzie, G. A. and Moore, D. P. and Morpeth, S. C. and Mwanany and a, L. and Paveenkittiporn, W. and Ziaur Rahman, M. and Rahman, M. and Rhodes, J. and Sow, S. O. and Tapia, M. D. and Deloria Knoll, M.	Upper Respiratory Tract Co-detection of Human Endemic Coronaviruses and High-density Pneumococcus Associated With Increased Severity Among HIV-Uninfected Children Under 5 Years Old in the PERCH Study	2021	Wrong population
Park, J. and Lee, S. H. and You, S. C. and Kim, J. and Yang, K.	Non-steroidal anti-inflammatory agent use may not be associated with mortality of coronavirus disease 19	2021	Wrong population
Park, J. N. and Owczarzak, J. and Urquhart, G. and Morris, M. and Weicker, N. P. and Rouhani, S. and Sherman, S. G.	HIV Risk Among Urban and Suburban People Who Inject Drugs: Elevated Risk Among Fentanyl and Cocaine Injectors in Maryland	2022	Wrong population
Park, S. H. and Kim, H. J. and Lee, C. K. and Song, E. M. and Kang, S. B. and Jang, B. I. and Kim, E. S. and Kim, K. O. and Lee, Y. J. and Kim, E. Y. and Jung, Y. J. and Park, S. K. and Park, D. I. and Ye, B. D. and Jung, S. A. and Yang, S. K.	Safety and Optimal Timing of BCG Vaccination in Infants Born to Mothers Receiving Anti-TNF Therapy for Inflammatory Bowel Disease	2020	Wrong population
Parker, A. and Koegelenberg, C. F. N. and Moolla, M. S. and Louw, E. H. and Mowlana, A. and NortjÃ©, A. and Ahmed, R. and Brittain, N. and Lalla, U. and Allwood, B. W. and Prozesky, H. and Schrueder, N. and Taljaard, J. J.	High HIV prevalence in an early cohort of hospital admissions with COVID-19 in Cape Town, South Africa	2020	Single centre
Pascale, M. M. and Frongillo, F. and Bianco, G. and Gali and ro, F. and Nure, E. and Agnes, S. and Giovinazzo, F.	COVID-19 Syndrome After Liver Transplant: Immunosuppression Role and Risk Factors for Mortality	2022	Incorrect study design
Pascual, J. and Melilli, E. and Jimenez-Martin, C. and Gonzalez-Monte, E. and Zarraga, S. and Gutierrez-Dalmau, A. and Lopez-Jimenez, V. and Juega, J. and Munoz-Cepeda, M. and Lorenzo, I. and Facundo, C. and Ruiz-Fuentes, M. D. C. and Mazuecos, A. and Sanchez-Alvarez, E. and Crespo, M. and Spanish Society of Nephrology, Covid-Group	COVID-19-related Mortality During the First 60 Days After Kidney Transplantation	2020	n<50
Pastor, D. M. and Lee-Wisdom, K. and Arai, A. E. and Sirajuddin, A. and Rosing, D. R. and Korchin, B. and Gulley, J. L. and Bilusic, M.	Fast Clearance of the SARS-CoV-2 Virus in a Patient Undergoing Vaccine Immunotherapy for Metastatic Chordoma: A Case Report	2020	n<50
Patel, V. V. and Felsen, U. R. and Fisher, M. and Fazzari, M. J. and Ginsberg, M. S. and Beil, R.	Clinical Outcomes and Inflammatory Markers by HIV Serostatus and Viral	2021	Single centre

and Akiyama, M. J. and Anastos, K. and Hanna, D. B.	Suppression in a Large Cohort of Patients Hospitalized With COVID-19		
Peach, E. and Rutter, M. and Lanyon, P. and Grainge, M. J. and Hubbard, R. and Aston, J. and Bythell, M. and Stevens, S. and Pearce, F.	Risk of death among people with rare autoimmune diseases compared with the general population in England during the 2020 COVID-19 pandemic	2021	Wrong outcome
Pereira, Marcus R and Arcasoy, Selim and Farr, Maryjane A and Mohan, Sumit and Emond, Jean C and Tsapepas, Demetra S and Shi, Qiuhu and Purpura, Lawrence and Uhlemann, Anneâ€□Catrin and Zucker, Jason	Outcomes of COVID-19 in solid organ transplant recipients: a matched cohort study	2021	Single centre
Permpalung, Nitipong and Bazemore, Katrina and Chiang, Teresa Po-Yu and Mathew, Joby and Barker, Lindsay and Nematollahi, Saman and Cochran, Willa and Sait, Afrah S and Avery, Robin K and Shah, Pali D	Impact of COVID-19 on lung allograft and clinical outcomes in lung transplant recipients: a case-control study	2021	n<50
Perrotta, Cristina M	Evaluation of HIV Status as a Risk Factor for COVID-19 Infection: A Combined Cohort Study	2021	Incorrect study design
Peters, L. L. and Raymer, D. S. and Pal, J. D. and Ambardekar, A. V.	Association of COVID-19 Vaccination With Risk of COVID-19 Infection, Hospitalization, and Death in Heart Transplant Recipients	2022	Single centre
Petersen, M. W. and Meyhoff, T. S. and Helleberg, M. and Kjaer, M. N. and Granholm, A. and HjortsÃ¸, C. J. S. and Jensen, T. S. and MÃ¸ller, M. H. and Hjortrup, P. B. and Wetterslev, M. and Vesterlund, G. K. and Russell, L. and JÃ¸rgensen, V. L. and Tjelle, K. and Benfield, T. and Ulrik, C. S. and Andreasen, A. S. and Mohr, T. and Bestle, M. H. and Poulsen, L. M. and Hitz, M. F. and Hildebr and t, T. and Knudsen, L. S. and MÃ¸ller, A. and SÃ¸lling, C. G. and BrÃ¸chner, A. C. and Rasmussen, B. S. and Nielsen, H. and Christensen, S. and StrÃ¸m, T. and Cronhjort, M. and Wahlin, R. R. and Jakob, S. and Cioccari, L. and Venkatesh, B. and Hammond, N. and Jha, V. and Myatra, S. N. and Gluud, C. and Lange, T. and Perner, A.	Low-dose hydrocortisone in patients with COVID-19 and severe hypoxia (COVID STEROID) trial-Protocol and statistical analysis plan	2020	Wrong population
PiÃ±ana, JosÃ© Luis and Martino, Rodrigo and GarcÃa-GarcÃa, Irene and Parody, RocÃo and Morales, MarÃa Dolores and Benzo, Gonzalo and GÃ³mez-Catalan, Irene and Coll, Rosa and De La Fuente, Ignacio and Luna, Alej and ro	Risk factors and outcome of COVID-19 in patients with hematological malignancies	2020	Paediatric data
Pinna, G.	Sex and COVID-19: A Protective Role for Reproductive Steroids	2021	Wrong population
Pistor, M. and Hoepner, A. G. F. and Lin, Y. and Jung, S. and Bassetti, C. L. and Chan, A. and Salmen, A. and Hoepner, R.	Immunotherapies and COVID-19 mortality: a multidisciplinary open data analysis based on FDA's Adverse Event Reporting System	2021	Wrong population
Pistor, M. and Hoepner, R. and Hoepner, A. G. F. and Lin, Y. and Jung, S. and Bassetti, C. L. and Chan, A. and Salmen, A.	Multiple Sclerosis immunotherapies and COVID-19 mortality: an analysis of the FDA Adverse Event Reporting System	2022	Wrong population
Plummer, M. M. and Pavia, C. S.	COVID-19 Vaccines for HIV-Infected Patients	2021	Incorrect study design
Ponsford, M. J. and Ward, T. J. C. and Stoneham, S. M. and Dallimore, C. M. and Sham, D. and Osman, K. and Barry, S. M. and Jolles, S. and Humphreys, I. R. and Farewell, D.	A Systematic Review and Meta-Analysis of Inpatient Mortality Associated With Nosocomial and Community COVID-19 Exposes the Vulnerability of Immunosuppressed Adults	2021	Wrong outcome
Pouladzadeh, M. and Safdarian, M. and Eshghi, P. and Abolghasemi, H. and Bavani, A. G. and Sheibani, B. and Moradi Choghakabodi, P. and Feghhi, A. and Ghafourian Boroujerdnia, M. and Forouzan, A. and Jalali Far, M. A. and Kaydani, G. A. and Rajaei, E. and Amin, M. and Torabizadeh, M. and Yousefi, F. and Hadaddezfuli, R.	A randomized clinical trial evaluating the immunomodulatory effect of convalescent plasma on COVID-19-related cytokine storm	2021	Wrong outcome
Prabhu, S. and Poongulali, S. and Kumarasamy, N.	Impact of COVID-19 on people living with HIV: A review	2020	Incorrect study design

Prashantha, C. N. and Gouthami, K. and Lavanya, L. and Bhavanam, S. and Jakhar, A. and Shakthiraju, R. G. and Suraj, V. and Sahana, K. V. and Sujana, H. S. and Guruprasad, N. M. and Ramach and ra, R.	Molecular screening of antimalarial, antiviral, anti-inflammatory and HIV protease inhibitors against spike glycoprotein of coronavirus	2021	Wrong outcome
Prower, E. and Hadfield, S. and Saha, R. and Woo, T. and Ang, K. M. and Metaxa, V.	A critical care outreach team under strain - Evaluation of the service provided to patients with haematological malignancy during the Covid-19 pandemic	2022	Insufficient original data
Pujari, S. and Gaikwad, S. and Chitalikar, A. and Dabhade, D. and Joshi, K. and Bele, V.	Short Communication: Coronavirus Disease 19 Among People Living with HIV in Western India: An Observational Cohort Study	2021	Single centre
Qasim, A. and Mansour, M. and Kousa, O. and Awad, D. and Abuhazeem, B. and Millner, P. and Velagapudi, M.	A case of coronavirus disease 2019 in acquired immunodeficiency syndrome patient: a case report and review of the literature	2020	Insufficient original data
Queiroz, N. S. F. and Teixeira, F. V. and Motta, M. P. and Chebli, L. A. and Hino, A. A. F. and Martins, C. A. and Quaresma, A. B. and da Silva, A. A. P. and DamiÃ£o, Aomc and Saad-Hossne, R. and Kotze, P. G.	Risk stratification and geographical mapping of Brazilian inflammatory bowel disease patients during the COVID-19 outbreak: Results from a nationwide survey	2021	Wrong outcome
QuirÃ³s-GonzÃ¡lez, V. and Rubio, R. and Pulido, F. and Rial-Crestelo, D. and MartÃn-Jurado, C. and HernÃ¡ndez-Ros, MÃ and JimÃ©nez, E. A. L. and Miguel Ferrari, J. and Manuel Caro-Teller, J. and Pinar, Ã“ and Pedrera-JimÃ©nez, M. and GarcÃa-Barrio, N. and Serrano, P. and Luis Bernal, J.	Healthcare Outcomes In Patients With Hiv Infection At A Tertiary Hospital During The COVID-19 Pandemic	2021	Single centre
Quitadamo, P. A. and Comegna, L. and Cristalli, P.	Anti-Infective, Anti-Inflammatory, and Immunomodulatory Properties of Breast Milk Factors for the Protection of Infants in the Pandemic From COVID-19	2020	Wrong population
Rabaan, A. A. and Al-Ahmed, S. H. and Muhammad, J. and Khan, A. and Sule, A. A. and Tirupathi, R. and Mutair, A. A. and Alhumaid, S. and Al-Omari, A. and Dhawan, M. and Tiwari, R. and Sharun, K. and Mohapatra, R. K. and Mitra, S. and Bilal, M. and Alyami, S. A. and Emran, T. B. and Moni, M. A. and Dhama, K.	Role of Inflammatory Cytokines in COVID-19 Patients: A Review on Molecular Mechanisms, Immune Functions, Immunopathology and Immunomodulatory Drugs to Counter Cytokine Storm	2021	Wrong population
Ramos, L. and Carrillo-Palau, M. and Alonso-Abreu, I. and Reygosa, C. and HernÃ¡ndez-Alvarez, N. and Amaral, C. and HernÃ¡ndez, A. and BenÃtez-Zafra, F. and PÃ©rez-GonzÃ¡lez, F. and Quintana-DÃaz, H. and Hern and ez-Guerra, M.	COVID-19 vaccination rate and willingness of an additional dose among inflammatory bowel disease patients receiving biologic therapy: Fearless and with desire	2022	Wrong outcome
RÃºa-Figueroa, I. and RÃºa-Figueroa, D. and PÃ©rez-Veiga, N. and Anzola, A. M. and Galindo-Izquierdo, M. and Calvo-AlÃ©n, J. and FernÃ¡ndez-Nebro, A. and SangÃ¼esa, C. and Menor-Almagro, R. and Tomero, E. and Del Val, N. and Uriarte-Isazelaya, E. and Blanco, R. and Andreu, J. L. and Boteanu, A. and NarvÃ¡ez, J. and Cobo, T. and BohÃ³rquez, C. and Montilla, C. and Salas, E. and Toyos, F. J. and Bernal, J. A. and Salgado, E. and Freire, M. and Mas, A. J. and ExpÃ³sito, L. and HernÃ¡ndez-Beriain, J. A. and Ibarguengoitia, O. and Velloso-Feijoo, M. L. and Lozano-Rivas, N. and Bonilla, G. and Moreno, M. and JimÃ©nez, I. and Quevedo-Vila, V. and PecondÃ³n, A. and Aurrecoechea, E. and Valls, E. and MouriÃ±o, C. and VÃ¡zquez-RodrÃguez, T. and Pego-Reigosa, J. M.	Antimalarials exert a cardioprotective effect in lupus patients: Insights from the Spanish Society of Rheumatology Lupus Register (RELESSER) analysis of factors associated with heart failure	2022	Wrong outcome
Ravanan, R. and Mumford, L. and Ushiro-Lumb, I. and Callaghan, C. and Pettigrew, G. and Thorburn, D. and Gardiner, D. and Forsythe, J. and Otdt Clinical, Team	Two Doses of SARS-CoV-2 Vaccines Reduce Risk of Death Due to COVID-19 in Solid Organ Transplant Recipients: Preliminary Outcomes From a UK Registry Linkage Analysis	2021	Wrong outcome
Razia, D. and Olson, M. T. and Walia, R. and Bremner, R. M. and Smith, M. A. and Tokman, S.	A Comparison of Short-Term Morbidity and Mortality Among Inpatient Lung Transplant Recipients	2022	n<50

	Transplanted for COVID-19 and Other Restrictive Lung Diseases		
Razia, D. and Omar, A. and Grief, K. and Walia, R. and Tokman, S.	COVID-19 Has a High Mortality Rate in Lung Transplant Recipients: A Large Single-Center Experience	2022	Single centre
Reece, M. D. and Taylor, R. R. and Song, C. and Gavegnano, C.	Targeting Macrophage Dysregulation for Viral Infections: Novel Targets for Immunomodulators	2021	Wrong outcome
Rentsch, C. T. and DeVito, N. J. and MacKenna, B. and Morton, C. E. and Bhaskaran, K. and Brown, J. P. and Schultze, A. and Hulme, W. J. and Croker, R. and Walker, A. J. and Williamson, E. J. and Bates, C. and Bacon, S. and Mehrkar, A. and Curtis, H. J. and Evans, D. and Wing, K. and Inglesby, P. and Mathur, R. and Drysdale, H. and Wong, A. Y. S. and McDonald, H. I. and Cockburn, J. and Forbes, H. and Parry, J. and Hester, F. and Harper, S. and Smeeth, L. and Douglas, I. J. and Dixon, W. G. and Evans, S. J. W. and Tomlinson, L. and Goldacre, B.	Effect of pre-exposure use of hydroxychloroquine on COVID-19 mortality: a population-based cohort study in patients with rheumatoid arthritis or systemic lupus erythematosus using the OpenSAFELY platform	2021	Immunosuppressio n as treatment
Revelo-Garcia, R. and Danguilan, R. and De leon, D. F.	Pos-655 Risk Factors for in-Hospital Mortality in Chronic Peritoneal Dialysis Patients Admitted with Covid-19 at the National Kidney and Transplant Institute of the Philippines	2021	Wrong population
Rezende, R. P. V. and Mendonca de Santana, F. and Figueiredo, C. P.	Unchanged trend in mortality from systemic lupus erythematosus during the 2020 COVID-19 pandemic: A nationwide population-based study	2022	Wrong outcome
Ricciuto, A. and Lamb, C. A. and Benchimol, E. I. and Walker, G. J. and Kennedy, N. A. and Kuenzig, M. E. and Kaplan, G. G. and Kappelman, M. D. and Ungaro, R. C. and Colombel, J. F. and Brenner, E. J. and Agrawal, M. and Reinisch, W. and Griffiths, A. M. and Sebastian, S.	Inflammatory Bowel Disease Clinical Activity is Associated with COVID-19 Severity Especially in Younger Patients	2022	Wrong outcome
Riches, John Charles	Impact of COVID-19 in patients with lymphoid malignancies	2021	Incorrect study design
Rinaldi, Matteo and Bartoletti, Michele and Bussini, Linda and Pancaldi, Livia and Pascale, Renato and Comai, Giorgia and Morelli, Mariacristina and Ravaioli, Matteo and Cescon, Matteo and Cristini, Francesco	COVID-19 in solid organ transplant recipients: No difference in survival compared to general population	2021	n<50
Ringer, M. and Azmy, V. and Kaman, K. and Tang, D. and Cheung, H. and Azar, M. M. and Price, C. and Malinis, M.	A retrospective matched cohort single-center study evaluating outcomes of COVID-19 and the impact of immunomodulation on COVID-19-related cytokine release syndrome in solid organ transplant recipients	2021	Single centre
Rivera, J. C. H. H. and Mendoza, M. S. and Covarrubias, L. G. and Ramirez, A. L. Q. and Reyes, L. C. and Hern and ez, M. B. and Martinez, J. R. and Contla, Y. P. and Duran, J. M. V. and Rivas, A. T. and Flores, S. L. R. and Murillo, W. A. Q. and Sierra, J. R. P.	Mortality Due to COVID-19 in Renal Transplant Recipients, Related to Variants of SARS-CoV-2 and Vaccination in Mexico	2022	Wrong outcome
Rizk, J. G. and Kalantar-Zadeh, K. and Mehra, M. R. and Lavie, C. J. and Rizk, Y. and Forthal, D. N.	Pharmaco-Immunomodulatory Therapy in COVID-19	2020	Wrong population
Rodriguez-Cubillo, B. and Moreno de la Higuera, M. A. and Perez-Flores, I. and Calvo Romero, N. and Aiffil, A. S. and Arribi Vilela, A. and Peix, B. and Huertas, S. and Juez, A. and Sanchez-Fructuoso, A. I.	Clinical Effectiveness of SARS-CoV-2 Vaccination in Renal Transplant Recipients. Antibody Levels Impact in Pneumonia and Death	2022	Duplicate
Rodriguez-Cubillo, B. and Moreno de la Higuera, M. A. and Perez-Flores, I. and Calvo Romero, N. and Aiffil, A. S. and Arribi Vilela, A. and Peix, B. and Huertas, S. and Juez, A. and Sanchez-Fructuoso, A. I.	Clinical Effectiveness of SARS-CoV-2 Vaccination in Renal Transplant Recipients. Antibody Levels Impact in Pneumonia and Death	2022	Duplicate
Rodriguez-Cubillo, B. and Moreno De La Higuera, M. A. and Perez-Flores, I. and Calvo Romero, N. and Aiffil, A. S. and Arribi Vilela, A.	Clinical Effectiveness of SARS-CoV-2 Vaccination in Renal Transplant Recipients. Antibody Levels Impact in Pneumonia and Death	2022	Single centre

and Peix, B. and Huertas, S. and Juez, A. and Sanchez-Fructuoso, A. I.			
Rodríguez-Cubillo, B., de la Higuera, M.A.M., Pérez-Flores, I., Romero, N.C., Aiffil, A.S., Vilela, A.A., Peix, B., Huertas, S., Juez, A. and Sanchez-Fructuoso, A.I	Clinical Effectiveness of SARS-CoV-2 Vaccination in Renal Transplant Recipients. Antibody Levels Impact in Pneumonia and Death: Erratum	2022	Wrong population
Rodriguez-Peralvarez, M. and Colmenero, J. and Salcedo, M. and Spanish Society of Liver, Transplantation	Reply to: "Age and comorbidity are central to the risk of death from COVID-19 in liver transplant recipients"	2021	Incorrect study design
Roldan, M. K.	POS-493 Predictors of Mortality in Chronic Hemodialysis Patients with COVID-19 at National Kidney and Transplant Institute: A Retrospective Cohort Study	2021	Single centre
Romero-HernÃ¡ndez, B. and MartÃnez-GarcÃa, L. and RodrÃguez-Dominguez, M. and MartÃ-nez-Sanz, J. and VÃ©lez-DÃaz-PallarÃ©s, M. and PÃ©rez Mies, B. and Muriel, A. and Gea, F. and PÃ©rez-ElÃas, M. J. and GalÃ¡n, J. C.	The Negative Impact of COVID-19 in HCV, HIV, and HPV Surveillance Programs During the Different Pandemic Waves	2022	Wrong outcome
Rommasi, F. and Nasiri, M. J. and Mirsaeidi, M.	Immunomodulatory agents for COVID-19 treatment: possible mechanism of action and immunopathology features	2022	Wrong population
Roncati, L. and Corsi, L. and Barbolini, G.	Abnormal immunothrombosis and lupus anticoagulant in a catastrophic COVID-19 recalling Asherson's syndrome	2021	n<50
Routray, P. and Samal, S. and Mishra, D.	Long term morbidity and mortality in covid patients discharged from hospital with or without steroid as discharge medication	2021	Wrong population
Roy, K. and Himelfarb, A. and Karrah, K. and Porterfield, L. and Paremoer, L. and Serag, H. and Lee, W. C.	The Social, Behavioral, and Ethical Modalities of COVID-19 on HIV Care in South Africa: A Systematic Review	2022	Wrong outcome
Ruiz-AntorÃ¡n, B. and Sancho-LÃ³pez, A. and Torres, F. and FernÃ¡ndez-Cruz, A.	A Response to: Letter to the Editor Regarding Combination of Tocilizumab and Steroids to Improve Mortality in Patients with Severe COVID-19 Infection: A Spanish, Multicenter, Cohort	2021	Incorrect study design
Ruiz-AntorÃ¡n, B. and Sancho-LÃ³pez, A. and Torres, F. and Moreno-Torres, V. and de Pablo-LÃ³pez, I. and GarcÃa-LÃ³pez, P. and Abad-Santos, F. and Rosso-FernÃ¡ndez, C. M. and Aldea-Perona, A. and MontanÃ©, E. and Aparicio-HernÃ¡ndez, R. M. and Llop-Rius, R. and PedrÃ³s, C. and GijÃ³n, P. and HernÃ¡ndez-Carballo, C. and Pedrosa-MartÃnez, M. J. and RodrÃguez-JimÃ©nez, C. and Prada-Ramallal, G. and Cabrera-GarcÃa, L. and Aguilar-GarcÃa, J. A. and Sanjuan-Jimenez, R. and Ortiz-Barraza, E. I. and SÃ¡nchez-Chica, E. and FernÃ¡ndez-Cruz, A.	Combination of Tocilizumab and Steroids to Improve Mortality in Patients with Severe COVID-19 Infection: A Spanish, Multicenter, Cohort Study	2021	Wrong population
Ruiz-Irastorza, G. and MartÃn-Iglesias, D. and Soto-Peleteiro, A.	Update on antimalarials and systemic lupus erythematosus	2020	Wrong outcome
Ruiz-Irastorza, G. and Pijoan, J. I. and Bereciartua, E. and Dunder, S. and Dominguez, J. and Garcia-Escudero, P. and Rodrigo, A. and Gomez-Carballo, C. and Varona, J. and Guio, L. and Ibarrola, M. and Ugarte, A. and Martinez-Berriotxoa, A.	Second week methyl-prednisolone pulses improve prognosis in patients with severe coronavirus disease 2019 pneumonia: An observational comparative study using routine care data	2020	Wrong outcome
Ruscitti, P. and Berardicurti, O. and Di Benedetto, P. and Cipriani, P. and Iagnocco, A. and Shoenfeld, Y. and Giacomelli, R.	Severe COVID-19, Another Piece in the Puzzle of the Hyperferritinemic Syndrome. An Immunomodulatory Perspective to Alleviate the Storm	2020	Wrong outcome
Ryan, S. and Campbell, P. and Paskins, Z. and Hider, S. and Manning, F. and Rule, K. and Brooks, M. and Hassell, A.	Exploring the physical, psychological and social well-being of people with rheumatoid arthritis during the coronavirus pandemic: a single-centre, longitudinal, qualitative interview study in the UK	2022	Wrong population
Ryu, J. K. and Sozmen, E. G. and Dixit, K. and Montano, M. and Matsui, Y. and Liu, Y. and Helmy, E. and Deerinck, T. J. and Yan, Z. and	SARS-CoV-2 spike protein induces abnormal inflammatory blood clots neutralized by fibrin immunotherapy	2021	Wrong population

Schuck, R. and Acevedo, R. M. and Spencer, C. M. and Thomas, R. and Pico, A. R. and Zamvil, S. S. and Lynch, K. L. and Ellisman, M. H. and Greene, W. C. and Akassoglou, K.			
Rzeniewicz, K. and Larkin, J. and Menzies, A. M. and Turajlic, S.	Immunotherapy use outside clinical trial populations: never say never?	2021	Wrong population
S, F. A. and Madhu, M. and Udaya Kumar, V. and Dhingra, S. and Kumar, N. and Singh, S. and Ravich and iran, V. and Murti, K.	Nutritional Aspects of People Living with HIV (PLHIV) Amidst COVID-19 Pandemic: an Insight	2022	Wrong outcome
Saezâ€□GimÃ©nez, Berta and Berastegui, Cristina and Barrecheguren, Miriam and Revillaâ€□LÃ³pez, Eva and Los Arcos, Ibai and Alonso, Rodrigo and Aguilar, Myriam and Mora, VÃctor M and Otero, Isabel and Reig, Juan P	COVID-19 in lung transplant recipients: a multicenter study	2021	Insufficient original data
Sagris, D. and Florentin, M. and Tasoudis, P. and Korompoki, E. and Gatselis, N. and Giamarellos-Bourboulis, E. J. and Milionis, H. and Douketis, J. and Spyropoulos, A. C. and Dalekos, G. and Ntaios, G.	Immunomodulation and Reduction of Thromboembolic Risk in Hospitalized COVID-19 Patients: Systematic Review and Meta-Analysis of Randomized Trials	2021	Wrong population
Sahilu, T. and Sheleme, T. and Melaku, T.	Severity and Mortality Associated with Steroid Use among Patients with COVID-19: A Systematic Review and Meta-Analysis	2021	Wrong population
Sahoo, A. and Swain, S. S. and Paital, B. and P and a, M.	Combinatorial approach of vitamin C derivative and anti-HIV drug-darunavir against SARS-CoV-2	2022	Wrong population
Sahu, A. K. and Mathew, R. and Bhat, R. and Malhotra, C. and Nayer, J. and Aggarwal, P. and Galwankar, S.	Steroids use in non-oxygen requiring COVID-19 patients: a systematic review and meta-analysis	2021	Wrong population
Sahu, Kamal Kant and Siddiqui, Ahmad Daniyal	A review on recipients of hematopoietic stem cell transplantation patients with COVID-19 infection	2021	Incorrect study design
Sakthiswary, R. and Chuah, H. Y. and Chiang, K. S. and Liew, Y. S. and Muhammad Aizat, N. A.	COVID-19 in systemic lupus erythematosus: A pooled analysis and systematic review of case reports and series	2021	n<50
Sanchezâ€□Pina, JosÃ© MarÃa and RodrÃguez Rodriguez, Mario and Castro Quismondo, Nerea and Gil Manso, Rodrigo and Colmenares, Rafael and Gil Alos, Daniel and Paciello, Mari Liz and Zafra, Denis and Garciaâ€□Sanchez, Cristina and Villegas, Carolina	Clinical course and risk factors for mortality from COVID-19 in patients with haematological malignancies	2020	n<50
Santeusanio, A. D. and Menon, M. C. and Liu, C. and Bhansali, A. and Patel, N. and Mahir, F. and Rana, M. and Tedla, F. and Mahamid, A. and Fenig, Y. and Zendel, A. and Delaney, V. and De Boccardo, G. and Farouk, S. S. and Sehgal, V. and Khaim, R. and Jacobs, S. E. and Dunn, D. and Sullivan, T. and Taimur, S. and Baneman, E. and Florman, S. and Shapiro, R.	Influence of patient characteristics and immunosuppressant management on mortality in kidney transplant recipients hospitalized with coronavirus disease 2019 (COVID-19)	2021	n<50
Saponara, M. and Pala, L. and Conforti, F. and Rubatto, M. and De Risi, I. and Spagnolo, F. and Guida, M. and Bossi, P. and Quaglino, P. and Queirolo, P.	Patients with locally advanced and metastatic cutaneous squamous cell carcinoma treated with immunotherapy in the era of COVID-19: stop or go? Data from five Italian referral cancer centers	2020	Insufficient original data
Sari, A. and Aslan, M. and Ekinci, O.	The effect of steroids used in the treatment of coronavirus disease 2019 on infections in intensive care	2022	Wrong population
Sarkar, I. and Sen, A.	In silico screening predicts common cold drug Dextromethorphan along with Prednisolone and Dexamethasone can be effective against novel Coronavirus disease (COVID-19)	2022	Wrong population
Sarkar, S. and Khanna, P. and Soni, K. D.	Are the steroids a blanket solution for COVID-19? A systematic review and meta-analysis	2021	Wrong population
Sarma, P. and Bhattacharyya, A. and Kaur, H. and Prajapat, M. and Prakash, A. and Kumar, S. and Bansal, S. and Kirubakaran, R. and Reddy, D. H. and Muktesh, G. and Kaushal, K. and	Efficacy and safety of steroid therapy in COVID-19: A rapid systematic review and Meta-analysis	2020	Wrong population

Sharma, S. and Shekhar, N. and Avti, P. and Thota, P. and Medhi, B.			
Sattui, S. E. and Crow, M. K. and Navarro-MillÃ¡n, I.	The role of immunomodulatory medications in the treatment of COVID-19	2021	Wrong population
Sawalha, A. H. and Zhao, M. and Coit, P. and Lu, Q.	Epigenetic dysregulation of ACE2 and interferon-regulated genes might suggest increased COVID-19 susceptibility and severity in lupus patients	2020	Wrong population
Saxena, H. M.	Immunotherapy of COVID-19 with Bacille Calmette - Guerin: Where is the missing red herring?	2021	Wrong population
Sbikina, E. and Ivanov, A. and Khaimenova, T. and Vinnitskaya, E. and Solovyeva, O. and Akhmedianov, A. and Alikhanov, R.	Impact of COVID-19 to mortality in waiting list for liver transplantation. Single center study	2022	Wrong population
Schaenman, J. and Byford, H. and Grogan, T. R. and Motwani, Y. and Beaird, O. and Kamath, M. and Lum, E. and Meneses, K. and Sayah, D. and Vucicevic, D. and Saab, S.	Risk Factors Associated with ICU Admission and Death in Patients Hospitalized with COVID-19 Differ Between Solid Organ Transplant and Non-Solid Organ Transplant Patients	2022	Single centre
Schmalzle, S. A. and Viviano, N. A. and Mohanty, K. and Palmeiro, R. M. and Hoffmann, J. D. and Sheth-P and it, N. and Gruber-Baldini, A. and Stafford, K. A.	People aging with HIV - protecting a population vulnerable to effects of COVID-19 and its control measures	2021	Wrong population
Schmidt-Lauber, C. and Gunster, C. and Huber, T. B. and Spoden, M. and Grahammer, F.	Collateral Effects and Mortality of Kidney Transplant Recipients during the COVID-19 Pandemic	2021	Wrong outcome
Schold, J. D. and King, K. L. and Husain, S. A. and Poggio, E. D. and Buccini, L. D. and Mohan, S.	COVID-19 mortality among kidney transplant candidates is strongly associated with social determinants of health	2021	Wrong population
Scolari, Fern and o Luis and Hastenteufel, Laura Carolina Tavares and Einsfeld, LÃdia and Bueno, Julia and Orl and in, LetÃcia and Clausell, Nadine and Goldraich, Livia A	Impact of COVID-19 infection among heart transplant recipients: a Southern Brazilian experience	2022	n<50
Seijo, L. L. and Perez, A. and Shah, R. J. and Kolaitis, N. A. and Venado, A. and Leard, L. E. and Kleinhenz, M. and Singer, J. P. and Golden, J. A. and Kukreja, J. and Trinh, B. and Hays, S.	Respiratory disease, and treatment / thematic poster session mortality rate in lung transplant recipients infected with COVID-19	2021	Single centre
Sekar, N. and Sundaresan, K. T.	The Co-infection of Mild COVID-19 and Rhinocerebral Mucormycosis in a Patient Without Diabetes or Prior Steroid Use	2022	n<50
Sellier, P. and Alex and re-Castor, G. and Bouchaud, O. and Diamantis, S. and Hamet, G. and Brun, A. and Chabrol, A. and Machado, M. and Bouldouyre, M. A. and Ponscarme, D. and De Castro, N. and Leroy, P. and Turpault, I. and Rozenbaum, W. and Molina, J. M.	Causes of death among HIV-infected patients during the COVID-19 pandemic: A multicenter prospective study in the Paris Region	2021	Wrong outcome
Sen, A.	Repurposing prolactin as a promising immunomodulator for the treatment of COVID-19: Are common Antiemetics the wonder drug to fight coronavirus?	2020	Wrong population
Sendic, S. and Mansouri, L. and Havervall, S. and Thalin, C. and Lundahl, J. and Jacobson, S. H.	Impact of monocyte chemoattractants on inhospital mortality in relation to kidney function in patients with COVID-19	2021	Wrong population
Sengar, Manju and Chinnaswamy, Girish and Ranganathan, Priya and Ashok, Apurva and Bhosale, Shilpushp and Biswas, Sanjay and Chaturvedi, Pankaj and Dhamne, Chetan and Divatia, Jigeeshu and Dsa, Karishma	Outcomes of COVID-19 and risk factors in patients with cancer-a cohort study	2021	Single centre
SeyedAlinaghi, S. A. and Karimi, A. and Barzegary, A. and Mojdeganlou, H. and Vahedi, F. and Mirghaderi, S. P. and Shobeiri, P. and Ramezani, M. and Yousefi Konjdar, P. and Mirzapour, P. and Tantuoyir, M. M. and Mehraeen, E. and Dadras, O. and Voltarelli, F.	COVID-19 mortality in patients with immunodeficiency and its predictors: a systematic review	2022	Incorrect study design
Shadmanfar, S. and Jonaidi-Jafari, N. and Jafari, R. and Rastgar-Moqaddam, Z. and Saburi, A.	COVID-19 in rheumatoid arthritis cases: an Iranian referral center experience	2021	Insufficient original data

Shafiekhani, M. and Shahabinezhad, F. and Niknam, T. and Tara, S. A. and Haem, E. and Mardani, P. and Zare, Z. and Jafarian, S. and Mirzad Jahromi, K. and Arabsheybani, S. and Moeini, Y. S. and Alavi, J. and Jalali, S. S. and Salimi, M. and Shahriarirad, R. and Malekhosseini, S. A.	Evaluation of the therapeutic regimen in COVID-19 in transplant patients: where do immunomodulatory and antivirals stand?	2021	Single centre
Shah, H. and Busquets, A. C.	Psoriasis Flares in Patients With COVID-19 Infection or Vaccination: A Case Series	2022	n<50
Shahzad, Moazzam and Chaudhary, Sibgha Gull and Zafar, Muhammad U and Hassan, Maha A and Hussain, Ali and Ali, Fatima and Anwar, Iqra and Ahmed, Mamoon and Ahmed, Nausheen and Khurana, Sharad	Impact of COVID-19 in hematopoietic stem cell transplant recipients: A systematic review and metaâ€□analysis	2022	Insufficient original data
Shareef, M. A. and Bashaiwth, H. M. and AlAkbari, A. O. and Bahamran, M. S. and AlAmodi, M. O. and Albaiti, S. H. and Ali, M. A. and Eshaq, A. M. and Alkattan, K. and Alamodi, A. A.	A systematic review of contemporary evidence on SARS-CoV-2 and HIV coinfection: What does it look like up to date?	2020	n<50
Sharma, A. and Choudhary, D. and Kenwar, D. and Singh, S. and Ramch and ran, R. and Kumar Sp, S. and Chauhan, P.	Transplant related risk factors analysis of mortality in renal transplant recipients with covid-19-a single center-based retrospective study	2021	Single centre
Sharma, N. K. and P and e, R. and Bag, P.	Prolonged COVID RT-PCR and Higher Mortality in COVID-19 Patients with Rituximab Treated Non-Hodgkin-Lymphoma: A Case Series	2022	n<50
Sharma, Pratima and Chen, Vincent and Fung, Christopher M and Troost, Jonathan P and Patel, Vaiibhav N and Combs, Michael and Norman, Silas and Garg, Puneet and Colvin, Monica and Aaronson, Keith	COVID-19 outcomes among solid organ transplant recipients: a case-control study	2021	n<50
Sharmeen, Saika and Elghawy, Ahmed and Zarlasht, Fnu and Yao, Qingping	COVID-19 in rheumatic disease patients on immunosuppressive agents	2020	n<50
Shaw, B. and Shortt, J. and Low, M. and Rogers, B. and Kaplan, Z. and Fedele, P. and Gregory, G. and Vilcassim, S. and Gilbertson, M. and Grigoriadis, G. and Opat, S.	Low mortality in vaccinated immunocompromised haematology patients infected with SARS-CoV-2	2022	Duplicate
Shaya, S. and Choudhuri, S.	COVID-19 Mortality in concurrent multiple myeloma (mm) - A prospective and comparative case series through the first and second wave of the sars-cov-2 pandemic in a uk tertiary haematology centre	2021	Single centre
Shehab, M. and Alrashed, F. and Alfadhli, A.	COVID-19 Vaccine Booster Dose Willingness among Patients with Inflammatory Bowel Disease on Infliximab and Vedolizumab: A Cross-Sectional Study	2022	Wrong outcome
Shehab, M. and Zurba, Y. and Al Abdulsalam, A. and Alfadhli, A. and Elouali, S.	COVID-19 Vaccine Hesitancy among Patients with Inflammatory Bowel Disease Receiving Biologic Therapies in Kuwait: A Cross-Sectional Study	2021	Wrong outcome
Shen, Y. and Freeman, J. A. and Holl and , J. and Solterbeck, A. and Naidu, K. and Soosapilla, A. and Downe, P. and Tang, C. and Kerridge, I. and Wallman, L. and Van Bilsen, N. and Milogiannakis, V. and Akerman, A. and Martins Costa Gomes, G. and S and gren, K. and Cunningham, A. L. and Turville, S. and Mulligan, S. P.	COVID-19 vaccine failure in chronic lymphocytic leukaemia and monoclonal B-lymphocytosis; humoural and cellular immunity	2022	Wrong outcome
Sherer, R. and Lehmann, C. and Zhu, M. and Lio, J.	Cancer, transplantation, and other immunocompromising conditions were not significantly associated with severe COVID-19 or death in hospitalized COVID-19 patients in Chicago	2020	Wrong outcome
Shingare, Ashay and Bahadur, Madan M and Raina, Shailesh	COVID-19 in recent kidney transplant recipients	2020	Single centre

Shionoya, Y. and Taniguchi, T. and Kasai, H. and Sakuma, N. and Imai, S. and Shikano, K. and Takayanagi, S. and Yahaba, M. and Nakada, T. A. and Igari, H. and Sakao, S. and Suzuki, T.	Possibility of deterioration of respiratory status when steroids precede antiviral drugs in patients with COVID-19 pneumonia: A retrospective study	2021	Wrong population
Shoemaker, M. E. and Huynh, L. M. and Smith, C. M. and Mustad, V. A. and Duarte, M. O. and Cramer, J. T.	Immunomodulatory Effects of Vitamin D and Prevention of Respiratory Tract Infections and COVID-19	2022	Wrong population
Siegmund-Schultze, N.	COVID-19 after heart transplant: Risk of severe progressions and mortality are probably significantly increased. [German]	2020	Foreign language
Siewe Fodjo, J. N. and Faria de Moura Villela, E. and Van Hees, S. and Vanholder, P. and Reyntiens, P. and Colebunders, R.	Follow-Up Survey of the Impact of COVID-19 on People Living with HIV during the Second Semester of the Pandemic	2021	Wrong outcome
Sigel, K. and Swartz, T. and Golden, E. and Paranjpe, I. and Somani, S. and Richter, F. and De Freitas, J. K. and Miotto, R. and Zhao, S. and Polak, P. and Mutetwa, T. and Factor, S. and Meh and ru, S. and Mullen, M. and Cossarini, F. and Bottinger, E. and Fayad, Z. and Merad, M. and Gnjatic, S. and Aberg, J. and Charney, A. and Nadkarni, G. and Glicksberg, B. S.	Coronavirus 2019 and People Living With Human Immunodeficiency Virus: Outcomes for Hospitalized Patients in New York City	2020	Duplicate
Silva, E. C. G. E. and Schmitt, A. C. B. and Godoy, C. G. D. and Gambeta, A. C. and Carvalho, C. R. F. D. and Fu, C. and Tanaka, C. and Junior, C. T. and Carvalho, C. R. R. D. and Pompeu, J. E.	Ambulation capacity, age, immunosuppression, and mechanical ventilation are risk factors of in-hospital death in severe COVID-19: a cohort study	2022	Single centre
Silva, M. and Blamey, R. and Ceballos, M. E. and Araya, X. and BastÃas, C. and Twele, L. and MuÃ±oz, R. and Sciaraffia, A. and PiÃ±era, C.	[SARS-CoV-2 infection in people living with HIV. Topics on the global panorama and in Chile]	2022	Foreign language
Simms, E. L. and Chung, H. and Oberding, L. and Muruve, D. A. and McDonald, B. and Bromley, A. and Pillai, D. R. and Chun, J.	Post-mortem molecular investigations of SARS-CoV-2 in an unexpected death of a recent kidney transplant recipient	2021	n<50
Siserman, C. V. and Jeican, II and Gheban, D. and Anton, V. and Mironescu, D. and È˜uÈ™man, S. and VicÄƒ, M. L. and LazÄƒr, M. and AluaÈ™, M. and Toader, C. and Albu, S.	Fatal Form of COVID-19 in a Young Male Bodybuilder Anabolic Steroid Using: The First Autopsied Case	2022	n<50
Slimani, Y. and Abbassi, R. and El Fatoiki, F. Z. and Barrou, L. and Chiheb, S.	Systemic lupus erythematosus and varicella-like rash following COVID-19 in a previously healthy patient	2021	n<50
Sloan, M. and Gordon, C. and Lever, E. and Harwood, R. and Bosley, M. A. and Pilling, M. and Brimicombe, J. and Naughton, F. and Blane, M. and Walia, C. and D'Cruz, D.	COVID-19 and shielding: experiences of UK patients with lupus and related diseases	2021	Wrong outcome
Smith, M. K. and Chow, J. and Huang, R. and Omar, M. and Ebadi, M. and Wong, P. and Huard, G. and Yoshida, E. M. and Peretz, D. and Brahmania, M. and Montano-Loza, A. J. and Bhanji, R.	Covid-19 Infection in Liver Transplant Recipients: Clinical Features, Hospitalization, and Mortality from a Canadian Multicentre Cohort	2022	n<50
Smith, M. L. and Sharma, S. and Singh, T. P.	Comments on the Discussion Forum: Oromucosal immunomodulation as clinical spectrum mitigating factor in SARS-CoV-2 infection	2022	Wrong outcome
Snow, T. A. C. and Longobardo, A. and Brealey, D. and Down, J. and Satta, G. and Singer, M. and Arulkumaran, N.	Beneficial ex vivo immunomodulatory and clinical effects of clarithromycin in COVID-19	2022	Wrong outcome
So, J. M. and Umeh, C. and Noriega, S. and Stratton, E. and Aseri, M. and Gupta, R. C.	Use of Baricitinib in Combination With Remdesivir and Steroid in COVID-19 Treatment: A Multicenter Retrospective Study	2021	Wrong outcome
Song, N. and Wakimoto, H. and Rossignoli, F. and Bhere, D. and Ciccocioppo, R. and Chen, K. S. and Khalsa, J. K. and Mastrolia, I. and Samarelli, A. V. and Dominici, M. and Shah, K.	Mesenchymal stem cell immunomodulation: In pursuit of controlling COVID-19 related cytokine storm	2021	Wrong population
Soni, S. and Mebratu, Y. A.	B-cell lymphoma-2 family proteins-activated proteases as potential therapeutic targets for influenza A	2022	Wrong population

	virus and severe acute respiratory syndrome coronavirus-2: Killing two birds with one stone?		
Spiera, E. and Ungaro, R. C. and Kornbluth, A.	Effectiveness and Safety of COVID-19 Vaccines in Patients With Inflammatory Bowel Disease	2022	Incorrect study design
Spihlman, A. P. and Gadi, N. and Wu, S. C. and Moulton, V. R.	COVID-19 and Systemic Lupus Erythematosus: Focus on Immune Response and Therapeutics	2020	Insufficient original data
Sponga, S. and Benedetti, G. and Ferrara, V. and Nalli, C. and C, D. I. Nora and Lechiancole, A. and De Manna, N. D. and Dralov, A. and Vendramin, I. and Livi, U.	Are heart transplant patients at higher risk for mortality following SARS-CoV-2 infection single centre experience	2021	Single centre
Spottiswoode, N. and Bloomstein, J. D. and Caldera, S. and Sessolo, A. and McCauley, K. and Byanyima, P. and Zawedde, J. and Kalantar, K. and Kaswabuli, S. and Rutishauser, R. L. and Lieng, M. K. and Davis, J. L. and Moore, J. and Jan, A. and Iwai, S. and Shenoy, M. and Sanyu, I. and DeRisi, J. L. and Lynch, S. V. and Worodria, W. and Huang, L. and Langelier, C. R.	Pneumonia surveillance with culture-independent metatranscriptomics in HIV-positive adults in Uganda: a cross-sectional study	2022	Wrong outcome
Squillace, N. and Ricci, E. and Colella, E. and Bonfanti, P.	HIV and SARS-CoV-2 Co-Infection: What are the Risks?	2021	n<50
Stoeckle, K. and Johnston, C. D. and Jannat-Khah, D. P. and Williams, S. C. and Ellman, T. M. and Vogler, M. A. and Gulick, R. M. and Glesby, M. J. and Choi, J. J.	COVID-19 in Hospitalized Adults With HIV	2020	n<50
Stover, J. and Glaubius, R. and Kassanjee, R. and Dugdale, C. M.	Updates to the Spectrum/AIM model for the UNAIDS 2020 HIV estimates	2021	Insufficient original data
Strykowski, R. K. and Poonawalla, M. and Tyker, A. and Bauer Ventura, I. and Lee, C. and Jablonski, R. and Vij, R. and Chung, J. and Strek, M. and Adegunsoye, A.	Mortality Risk From COVID-19 Among Unvaccinated Subjects With Autoimmune Phenotypes of Interstitial Lung Disease	2022	n<50
Stutz, M. R. and Dylla, N. P. and Pearson, S. D. and Lecompte-Osorio, P. and Nayak, R. and Khalid, M. and Adler, E. and Boissiere, J. and Lin, H. and Leiter, W. and Little, J. and Rose, A. and Moran, D. and Mullowney, M. W. and Wolfe, K. S. and Lehmann, C. and Odenwald, M. and De La Cruz, M. and Giurcanu, M. and Pohlman, A. S. and Hall, J. B. and Chaubard, J. L. and Sundararajan, A. and Sidebottom, A. and Kress, J. P. and Pamer, E. G. and Patel, B. K.	Immunomodulatory fecal metabolites are associated with mortality in COVID-19 patients with respiratory failure	2022	Wrong population
Sultan, Almetwaly M and Mahmoud, Hossam K and Fathy, Gamaleldin Mohamed and Abdelfattah, Nabil M	The outcome of hematopoietic stem cell transplantation patients with COVID-19 infection	2021	n<50
Sultan, K. and Mone, A. and Durbin, L. and Khuwaja, S. and Swaminath, A.	Review of inflammatory bowel disease and COVID-19	2020	Incorrect study design
Sun, M. and Shankar, R. and Ko, M. and Chang, C. D. and Yeh, S. J. and Li, S. and Liu, K. and Zhou, G. and Xing, J. and VanVelsen, A. and VanVelsen, T. and Paithankar, S. and Feng, B. Y. and Young, K. and Strug, M. and Turco, L. and Wang, Z. and Schadt, E. and Chen, R. and Li, X. and Oskotsky, T. and Sirota, M. and Glicksberg, B. S. and Nadkarni, G. N. and Moeser, A. J. and Li, L. and Kim, S. and Zhou, J. and Chen, B.	Sex differences in viral entry protein expression, host responses to SARS-CoV-2, and in vitro responses to sex steroid hormone treatment in COVID-19	2020	Incorrect study design
Sung, K. Y. and Chang, T. E. and Wang, Y. P. and Lin, C. C. and Chang, C. Y. and Hou, M. C. and Lu, C. L.	SARS-CoV-2 vaccination in patients with inflammatory bowel disease: A systemic review and meta-analysis	2022	Wrong outcome
Suwanwongse, K. and Shabarek, N.	Variation in mortality of HIV/SARS-CoV-2 coinfected patients in the Bronx, New York City	2021	n<50
TÃ¶rÃ¼ner, M. and Kalkan Ä°, H. and AkyÃ¼z, F. and Tezel, A. and Ã‡elik, A. F.	Turkish IBD Organization's Position Statement on Inflammatory Bowel Disease Management Recommendations During COVID-19 Pandemic	2021	Wrong population
Tabesh, E. and Soheilipour, M. and Rezaeisadrabadi, M. and Zare-Farashb and i, E. and Mousavi-Roknabadi, R. S.	Comparison the effects and side effects of Covid-19 vaccination in patients with inflammatory bowel disease (IBD): a systematic scoping review	2022	Wrong outcome

Talamonti, M. and Galluzzo, M. and Chiricozzi, A. and Quaglino, P. and Fabbrocini, G. and Gisondi, P. and Marzano, A. V. and Potenza, C. and Conti, A. and Parodi, A. and Piaserico, S. and Bardazzi, F. and Argenziano, G. and Rongioletti, F. and Stingeni, L. and Micali, G. and Loconsole, F. and Rossi, M. T. and Bongiorno, M. R. and Feliciani, C. and Rubegni, P. and Amerio, P. and Fargnoli, M. C. and Pigatto, P. and Savoia, P. and NisticÃ², S. P. and Giustini, S. and Carugno, A. and Cannavo, S. P. and Rech, G. and Prignano, F. and Offidani, A. and Lombardo, M. and Zalaudek, I. and Bianchi, L. and Peris, K. and Balestri, R. and Bernardini, N. and Belloni Fortini, A. and Burl and o, M. and Caldarola, G. and Campione, E. and Cattaneo, A. and Dapavo, P. and Dastoli, S. and De Simone, C. and Di Nuzzo, S. and Diotallevi, F. and Fierro, M. T. and Franchi, C. and Esposito, M. and Foti, C. and Gambini, D. M. and Gambardella, A. and Girolomoni, G. and Giunta, A. and Guarneri, C. and Gualdi, G. and Hansel, K. and Megna, M. and Mugheddu, C. and Musumeci, M. L. and Patrizi, A. and Pellacani, G. and Richetta, A. G. and Rosi, E. and Sacchelli, L. and Tiberio, R. and Tilotta, G. and Trovato, E. and Venturini, M. and Vezzoni, R.	Characteristic of chronic plaque psoriasis patients treated with biologics in Italy during the COVID-19 Pandemic: Risk analysis from the PSO-BIO-COVID observational study	2021	n<50
Tam, C. S. and Brown, J. R. and Kahl, B. S. and Ghia, P. and Giannopoulos, K. and Jurczak, W. and Å imkoviÄ□, M. and Shadman, M. and Ã–sterborg, A. and Laurenti, L. and Walker, P. and Opat, S. and Chan, H. and Ciepluch, H. and Greil, R. and Tani, M. and TrnÄ›nÃ½, M. and Br and er, D. M. and Flinn, I. W. and Grosicki, S. and Verner, E. and Tedeschi, A. and Li, J. and Tian, T. and Zhou, L. and Marimpietri, C. and Paik, J. C. and Cohen, A. and Huang, J. and Robak, T. and Hillmen, P.	Zanubrutinib versus bendamustine and rituximab in untreated chronic lymphocytic leukaemia and small lymphocytic lymphoma (SEQUOIA): a randomised, controlled, phase 3 trial	2022	Wrong population
Tamuzi, J. L. and Ayele, B. T. and Shumba, C. S. and Adetokunboh, O. O. and Uwimana-Nicol, J. and Haile, Z. T. and Inugu, J. and Nyasulu, P. S.	Implications of COVID-19 in high burden countries for HIV/TB: A systematic review of evidence	2020	Compound risk group
Tan, E. H. and Sena, A. G. and Prats-Uribe, A. and You, S. C. and Ahmed, W. U. and Kostka, K. and Reich, C. and Duvall, S. L. and Lynch, K. E. and Matheny, M. E. and Duarte-Salles, T. and Bertolin, S. F. and Hripcsak, G. and Natarajan, K. and Falconer, T. and Spotnitz, M. and Ostropolets, A. and Blacketer, C. and Alshammari, T. M. and Alghoul, H. and Alser, O. and Lane, J. C. E. and Dawoud, D. M. and Shah, K. and Yang, Y. and Zhang, L. and Areia, C. and Golozar, A. and Relcade, M. and Casajust, P. and Jonnagaddala, J. and Subbian, V. and Vizcaya, D. and Lai, L. Y. and Nyberg, F. and Morales, D. R. and Posada, J. D. and Shah, N. H. and Gong, M. and Vivekanantham, A. and Abend, A. and Minty, E. P. and Suchard, M. and Rijnbeek, P. and Ryan, P. B. and Prieto-Alhambra, D.	Characteristics, outcomes, and mortality amongst 133,589 patients with prevalent autoimmune diseases diagnosed with, and 48,418 hospitalised for COVID-19: a multinational distributed network cohort analysis	2020	Paediatric data
Tan, Y. and Tang, F.	SARS-CoV-2-mediated immune system activation and potential application in immunotherapy	2021	Wrong outcome
Tanner, T. and Wahezi, D. M.	Hyperinflammation and the utility of immunomodulatory medications in children with COVID-19	2020	Wrong population
Targownik, L. E. and Bernstein, C. N. and Lakatos, P. L. and Murthy, S. K. and Benchimol, E. I. and Bitton, A. and Huang, J. G. and Kuenzig, M. E. and Jones, J. L. and Kaplan, G. G. and Lee, K. and Mukhtar, M. S. and T and on, P. and Windsor, J. W. and Panaccione, R.	Crohn's and Colitis Canada's 2021 Impact of COVID-19 and Inflammatory Bowel Disease in Canada: Risk Factors and Medications	2021	Incorrect study design
Taylor, M. F.	Author reply: Mortality in patients with kidney transplantation and SARS-CoV-2 infection. [Spanish]	2022	Incorrect study design

Tesoriero, J. M. and Swain, C. E. and Pierce, J. L. and Zamboni, L. and Wu, M. and Holtgrave, D. R. and Gonzalez, C. J. and Udo, T. and Morne, J. E. and Hart-Malloy, R. and Rajulu, D. T. and Leung, S. J. and Rosenberg, E. S.	Elevated COVID-19 outcomes among persons living with diagnosed HIV infection in New York State: Results from a population-level match of HIV, COVID-19, and hospitalization databases	2020	Duplicate
Thaunat, O. and Legeai, C. and Anglicheau, D. and Couzi, L. and Blancho, G. and Hazzan, M. and Pastural, M. and Savoye, E. and Bayer, F. and Morelon, E. and Le Meur, Y. and Bastien, O. and Caillard, S. and French nationwide Registry of Solid Organ Transplant Recipients with, Covid	IMPact of the COVID-19 epidemic on the moRTAlity of kidney transplant recipients and candidates in a French Nationwide registry sTudy (IMPORTANT)	2020	Wrong outcome
Thomas, G. and Frederick, E. and Hausburg, M. and Goldberg, L. and Hoke, M. and Roshon, M. and Mains, C. and Bar-Or, D.	The novel immunomodulatory biologic LMWF5A for pharmacological attenuation of the "cytokine storm" in COVID-19 patients: a hypothesis	2020	Wrong population
Thurm, C. and Reinhold, A. and Borucki, K. and Kahlfuss, S. and Feist, E. and Schreiber, J. and Reinhold, D. and Schraven, B.	Homologous and Heterologous Anti-COVID-19 Vaccination Does Not Induce New-Onset Formation of Autoantibodies Typically Accompanying Lupus Erythematodes, Rheumatoid Arthritis, Celiac Disease and Antiphospholipid Syndrome	2022	Wrong outcome
Tien, A. and Bhatnagar, M. S. and Sahota, A. K.	Incidence and Mortality of Covid-19 in Post-Liver Transplant Patients in a Large Integrated Healthcare System	2021	n<50
TiendrÃ©bÃ©ogo, Wendlassida JoÃ«lle StÃ©phanie and KaborÃ©, Fulgence and DiendÃ©rÃ©, Eric Arnaud and Ouedraogo, Dieu-DonnÃ©	Case series of chronic inflammatory rheumatic disease patients infected by coronavirus disease 2019 (COVID-19)	2020	Insufficient original data
Toombs, J. M. and Van den Abbeele, K. and Democratis, J. and Merricks, R. and M and al, A. K. J. and Missouris, C. G.	COVID-19 in three people living with HIV in the United Kingdom	2021	n<50
Torreggiani, M. and Fessi, H. and Piccoli, G. B.	On the need to better protect hemodialysis patients: a comment on "IMPact of the COVID-19 epidemic on the moRTAlity of kidney transplant recipients and candidates in a French Nationwide registry sTudy (IMPORTANT)"	2021	Incorrect study design
Torres, A. and Cilloniz, C.	Steroid therapy and antiviral treatment in SARS-CoV-2 pneumonia: clinical contexts and indications	2022	Wrong population
Torres, A. and Motos, A. and CillÃ³niz, C. and Ceccato, A. and FernÃ¡ndez-Barat, L. and GabarrÃºs, A. and Bermejo-Martin, J. and Ferrer, R. and Riera, J. and PÃ©rez-Arnal, R. and GarcÃa-Gasulla, D. and PeÃ±uelas, O. and Lorente, JÃ□ and de Gonzalo-Calvo, D. and Almansa, R. and MenÃ©ndez, R. and Palomeque, A. and Villar, R. A. and AÃ±Ã³n, J. M. and Balan MariÃ±o, A. and BarberÃ , C. and BarberÃ¡n, J. and Bl and ino Ortiz, A. and Boado, M. V. and Bustamante-Munguira, E. and Caballero, J. and CantÃ³n-Bulnes, M. L. and Carbajales PÃ©rez, C. and Carbonell, N. and CatalÃ¡n-GonzÃ¡lez, M. and de Frutos, R. and Franco, N. and GalbÃ¡n, C. and Gumucio-Sanguino, V. D. and de la Torre, M. D. C. and DÃaz, E. and Estella, Ã□ and Gallego, E. and GarcÃa Garmendia, J. L. and GÃ³mez, J. M. and Huerta, A. and GarcÃa, R. N. J. and Loza-VÃ¡zquez, A. and Marin-Corral, J. and Martin Delgado, M. C. and MartÃnez de la GÃ¡ndara, A. and MartÃnez Varela, I. and LÃ³pez Messa, J. and Albaiceta, G. M. and Nieto, M. and Novo, M. A. and PeÃ±asco, Y. and PÃ©rez-GarcÃa, F. and Pozo-Laderas, J. C. and Ricart, P. and Sagredo, V. and SÃ¡nchez-Miralles, A. and Sancho Chinesta, S. and Serra-Fortuny, M. and Socias, L. and SolÃ©-Violan, J. and Suarez-Sipmann, F. and Tamayo Lomas, L. and	Major candidate variables to guide personalised treatment with steroids in critically ill patients with COVID-19: CIBERESUCICOVID study	2022	Wrong population

Trenado, J. and Ãšbeda, A. and Valdivia, L. J. and Vidal, P. and BarbÃ©, F.			
Torun, S. and Karaman, I.	Acute Exacerbation of Rheumatoid Arthritis Misdiagnosed as COVID-19: A Case Report	2022	n<50
Traish, A. M.	Sex steroids and COVID-19 mortality in women	2021	Insufficient original data
Tripathy, S. and Alvarez, N. and Jaiswal, S. and Williams, R. and Al-Khadimi, M. and Hackman, S. and Phillips, W. and Kaur, S. and Cervantez, S. and Kelly, W. and Taverna, J.	Hypermetabolic lymphadenopathy following the administration of COVID-19 vaccine and immunotherapy in a lung cancer patient: a case report	2022	n<50
Truchetet, Marie-Elise and Drumez, Elodie and Barnetche, Thomas and Martin, Claire and Devaux, Mathilde and Goulenok, Tiphaine and Maria, Alex and re and Schmidt, Jean and Abdallah, Nassim Ait and Melki, Isabelle	Outcome of COVID-19 in patients with rheumatic and inflammatory diseases treated with mycophenolic acid: data from the French RMD COVID-19 cohort	2022	Wrong outcome
Turkmen, M. and Dogan, S.	Certolizumab pegol in the treatment of psoriasis: Real-life data	2021	Wrong outcome
Tveita, A. and Murphy, S. L. and Holter, J. C. and Kildal, A. B. and Michelsen, A. E. and Lerum, T. V. and Kaarbo, M. and Heggelund, L. and Holten, A. R. and Finbraten, A. K. and Muller, K. E. and Mathiessen, A. and Boe, S. and Fevang, B. and Granerud, B. K. and Tonby, K. and Lind, A. and Dudman, S. G. and Henriksen, K. N. and Muller, F. and Skjonsberg, O. H. and Troseid, M. and Barratt-Due, A. and Dyrhol-Riise, A. M. and Aukrust, P. and Halvorsen, B. and Dahl, T. B. and Uel and , T. and consortium, Nor-Solidarity and Norwegian, Sars-CoV-Study Group investigators	High circulating levels of the homeostatic chemokines CCL19 and CCL21 predict mortality and disease severity in Covid-19	2022	Wrong population
Udomkarnjananun, S. and Kerr, S. J.	Mortality risk factors of covid-19 infection in kidney transplantation recipients: A systematic review and meta-analysis of cohorts and clinical registries	2021	Duplicate
Vagonis, A. M. and MacMillan, A. C. and Kashiouris, M. G. and Jackson, P. D. and Mahmud, H. and Uber, R. K. and Mahashabde, M. and Nana-Sinkam, P.	Hospitalized COVID-19 patients with active lymphoma have eight times higher risk of death than COVID-19 controls	2021	Single centre
van Bremen, K. and Monin, M. and Schlabe, S. and Bischoff, J. and Rieke, G. J. and Schwarze-Z and er, C. and Wasmuth, J. C. and Rockstroh, J. K. and Boesecke, C.	Impact of COVID-19 on HIV late diagnosis in a specialized German centre	2022	Wrong outcome
van Wyngaard, A. and Whiteside, A.	AIDS and COVID-19 in southern Africa	2021	Insufficient original data
van Zeggeren, I. E. and Boelen, A. and van de Beek, D. and Heijboer, A. C. and Vlaar, A. P. J. and Brouwer, M. C.	Sex steroid hormones are associated with mortality in COVID-19 patients: Level of sex hormones in severe COVID-19	2021	Wrong population
Várnai, C., Palles, C., Arnold, R., Curley, H.M., Purshouse, K., Cheng, V.W., Booth, S., Campton, N.A., Collins, G.P., Hughes, D.J. and Kulasekararaj, A.G	Erratum: Mortality among adults with cancer undergoing chemotherapy or immunotherapy and infected with COVID-19 (JAMA Netw Open. (2022) 5:2 (e220130) DOI: 10.1001/jamanetworkopen.2022.0130)	2022	Insufficient original data
Varshney, K. and Ghosh, P. and Stiles, H. and Iriowen, R.	Risk Factors for COVID-19 Mortality Among People Living with HIV: A Scoping Review	2022	Incorrect study design
Venditto, V. J. and Haydar, D. and Abdel-Latif, A. and Gensel, J. C. and Anstead, M. I. and Pitts, M. G. and Creameans, J. and Kopper, T. J. and Peng, C. and Feola, D. J.	Immunomodulatory Effects of Azithromycin Revisited: Potential Applications to COVID-19	2021	Wrong outcome
Venturas, J. and Zamparini, J. and Shaddock, E. and Stacey, S. and Murray, L. and Richards, G. A. and Kalla, I. and Mahomed, A. and Mohamed, F. and Mer, M. and Maposa, I. and Feldman, C.	Comparison of outcomes in HIV-positive and HIV-negative patients with COVID-19	2021	Single centre
Vergori, A. and Boschini, A. and Notari, S. and Lorenzini, P. and Castilletti, C. and Colavita, F. and Matusali, G. and Tartaglia, E. and Gagliardini, R. and Boschi, A. and Cimini, E. and	SARS-CoV-2 Specific Immune Response and Inflammatory Profile in Advanced HIV-Infected Persons during a COVID-19 Outbreak	2022	n<50

Maeurer, M. and Piselli, P. and Angeli, L. and Antinori, A. and Agrati, C. and Girardi, E.			
Vetrano, Davide Liborio and Tazzeo, Clare and Palmieri, Luigi and Marengoni, Aless and ra and Zucchelli, Alberto and Lo Noce, Cinzia and Onder, Graziano	Comorbidity status of deceased COVID-19 in-patients in Italy	2021	Compound risk group
ViganÃ², C. and Mulinacci, G. and Palermo, A. and Barisani, D. and Pirola, L. and Fichera, M. and Invernizzi, P. and Massironi, S.	Impact of COVID-19 on inflammatory bowel disease practice and perspectives for the future	2021	Insufficient original data
Vinson, Am and a J and Agarwal, Gaurav and Dai, Ran and Anzalone, Alfred J and Lee, Stephen B and French, Evan and Olex, Amy and Madhira, Vithal and Mannon, Roslyn B	COVID-19 in solid organ transplantation: results of the national COVID cohort collaborative	2021	Wrong outcome
Virata, M. D. and Shenoi, S. V. and Ladines-Lim, J. and Villanueva, M. S. and Barakat, L. A.	Cumulative burden of non-communicable diseases predicts COVID hospitalization among people with HIV: A one-year retrospective cohort study	2021	Single centre
Vita, S. and Centanni, D. and Lanini, S. and Piselli, P. and Rosati, S. and Giancola, M. L. and Mondi, A. and Pinnetti, C. and Topino, S. and Chinello, P. and Mosti, S. and Gualano, G. and Faraglia, F. and Iacomi, F. and Marchioni, L. and Maritti, M. and Girardi, E. and Ippolito, G. and Nicastri, E. and On Behalf Of The Re, COVeRI Study Group	Benefits of Steroid Therapy in COVID-19 Patients with Different PaO(2)/FiO(2) Ratio at Admission	2021	Wrong outcome
Vivekanantham, A. and Burn, E. and Fern and ez-Bertolin, S. and Aragon, M. and Duarte-Salles, T. and Prieto-Alhambra, D.	Rheumatoid arthritis and the risk of COVID-19 diagnosis, hospitalisation and death: A population-based multi-state cohort analysis including 5,586,565 people in Catalonia, Spain	2021	Insufficient original data
von Hentig, N.	Repositioning HIV protease inhibitors and nucleos(t)ide RNA polymerase inhibitors for the treatment of SARS-CoV-2 infection and COVID-19	2021	Wrong outcome
Wang, W. and Snell, L. B. and Ferrari, D. and Goodman, A. L. and Price, N. M. and Wolfe, C. D. and Curcin, V. and Edgeworth, J. D. and Wang, Y.	Real-world effectiveness of steroids in severe COVID-19: a retrospective cohort study	2022	Wrong population
Wang, X. S.	Angiotensin-converting enzyme 2 connects COVID-19 with cancer and cancer immunotherapy	2021	Wrong population
Wang, Z. P. and Hua, M. and Jiu, T. and Ge, R. L. and Bai, Z.	Biofunctional roles of estrogen in coronavirus disease 2019: Beyond a steroid hormone	2022	Wrong population
Wanyuan Cui, Dr and Yousaf, Nadia and Bhosle, Jaishree and Minchom, Anna and Nicholson, Andrew G and Merina Ahmed, Dr and McDonald, Fiona and Locke, Imogen and Lee, Richard and O'Brien, Mary	Real-world outcomes in thoracic cancer patients with severe acute respiratory syndrome Coronavirus 2 (COVID-19): single UK institution experience	2020	n<50
Waterer, G. W. and Rello, J.	Steroids and COVID-19: We Need a Precision Approach, Not One Size Fits All	2020	Wrong population
Waters, Laura J and Pozniak, Anton L	COVID-19 death in people with HIV: interpret cautiously	2021	Incorrect study design
Webb, G. J. and Moon, A. M. and Barnes, E. and Barritt, A. S. and Marjot, T.	Determining risk factors for mortality in liver transplant patients with COVID-19	2020	n<50
Webb, G. J. and Moon, A. M. and Barnes, E. and Barritt, A. S. and Marjot, T.	Age and comorbidity are central to the risk of death from COVID-19 in liver transplant recipients	2021	Insufficient original data
Wetwittayakhlang, P. and Albader, F. and Golovics, P. A. and Hahn, G. D. and Bessissow, T. and Bitton, A. and Afif, W. and Wild, G. and Lakatos, P. L.	Clinical Outcomes of COVID-19 and Impact on Disease Course in Patients with Inflammatory Bowel Disease	2021	Single centre
Williams, S. V. and Whitaker, H. J. and Mumford, L. and Callaghan, C. and Curtis, R. M. K. and Stowe, J. and Kirsebom, F. and Thomas, J. and Ushiro-Lumb, I. and Ravanan, R. and Lopez-Bernal, J.	Effectiveness of COVID-19 Vaccines Against Hospitalization and Death with the SARS-CoV-2 Delta Variant in Solid Organ and Islet Transplant Recipients	2022	Wrong outcome
Wong, A. Y. and MacKenna, B. and Morton, C. E. and Schultze, A. and Walker, A. J. and	Use of non-steroidal anti-inflammatory drugs and risk of death	2021	Wrong population

Bhaskaran, K. and Brown, J. P. and Rentsch, C. T. and Williamson, E. and Drysdale, H. and Croker, R. and Bacon, S. and Hulme, W. and Bates, C. and Curtis, H. J. and Mehrkar, A. and Evans, D. and Inglesby, P. and Cockburn, J. and McDonald, H. I. and Tomlinson, L. and Mathur, R. and Wing, K. and Forbes, H. and Eggo, R. M. and Parry, J. and Hester, F. and Harper, S. and Evans, S. J. and Smeeth, L. and Douglas, I. J. and Goldacre, B.	from COVID-19: an OpenSAFELY cohort analysis based on two cohorts		
Woo, S. and Kim, B. and Heo, N. H. and Kim, M. S. and Yoon, Y. A. and Choi, Y. J.	Association of Lupus Anticoagulant status with Disease Course in SARS-CoV-2 (COVID-19) Infection	2022	Wrong population
Wu, Julie Tsu-Yu and Kwon, Daniel H and Glover, Michael J and Henry, Solomon and Wood, Douglas and Rubin, Daniel L and Koshkin, Vadim S and Schapira, Lidia and Shah, Sumit A	Changes in cancer management due to COVID-19 illness in patients with cancer in Northern California	2021	Indirect mortality
Wu, Q. and Hu, Y.	Integrated network pharmacology and molecular docking strategy to explore the mechanism of medicinal and edible Astragali Radix-Atractylodis Macrocephalae Rhizoma acting on pneumonia via immunomodulation	2020	Incorrect study design
Xie, B. and Zhang, J. and Li, Y. and Yuan, S. and Shang, Y.	COVID-19: Imbalanced Immune Responses and Potential Immunotherapies	2020	Insufficient original data
Yan, C. and Niu, Y. and Wang, X.	Blood transcriptome analysis revealed the crosstalk between COVID-19 and HIV	2022	Wrong outcome
Yanes, R. R. and Malijan, G. M. B. and Escora-Garcia, L. K. and Ricafrente, S. A. M. and Salazar, M. J. and Suzuki, S. and Smith, C. and Ariyoshi, K. and Solante, R. M. and Edrada, E. M. and Takahashi, K.	Detection of SARS-CoV-2 and HHV-8 from a large pericardial effusion in an HIV-positive patient with COVID-19 and clinically diagnosed Kaposi sarcoma: a case report	2022	n<50
Yang, D. and Li, H. and Chen, Y. and Ren, W. and Dong, M. and Li, C. and Jiao, Q.	Immunomodulatory mechanisms of abatacept: A therapeutic strategy for COVID-19	2022	Wrong outcome
Yang, J. and Yu, M. and Fu, G. and Lan, G. and Li, L. and Qiao, Y. and Zhao, J. and Qian, H. Z. and Zhang, X. and Liu, X. and Jin, X. and Chen, G. and Fang, Y. and Wang, Z. and Xu, J.	COVID-19 Vaccination Uptake Among a Nationwide Sample of People Living With HIV During the Early Phase of Vaccine Rollout in China	2022	Wrong outcome
Yang, M. and Li, A. and Wang, Y. and Tran, C. and Zhao, S. and Ao, G.	Monoclonal antibody therapy improves severity and mortality of COVID-19 in organ transplant recipients: A meta-analysis	2022	Incorrect study design
Yarkan TuÄŸsal, H. and Ä°zdeÅŸ, S. and KÃ¼Ã§Ã¼kÅŸahin, O.	20-Year-old female with fever, cough, and dyspnea: Acute lupus pneumonitis during the pandemic of coronavirus disease 2019 (COVID-19)	2021	n<50
Yarlagadda, K. and Mi, K. and Sendil, S. and Koons, C. L. and Kom and uri, S. and Cinicola, J. T.	A 31-Year-Old Man with COVID-19-Associated Empyema and Lupus Anticoagulant	2020	n<50
Yessayan, L. T. and Neyra, J. A. and Westover, A. J. and Szamosfalvi, B. and Humes, H. D.	Extracorporeal Immunomodulation Treatment and Clinical Outcomes in ICU COVID-19 Patients	2022	Wrong population
Yilmaz, F. and Yasar, S. and Tuncali, M. C. and Akin, S.	Complete response in a frail patient with high-grade B-cell lymphoma to only one cycle of R-CHOP or to prolonged COVID-19?	2021	Insufficient original data
Yilmaz, Gulay and Ebru, Ozdemir and Ibrahim, Berber and Ulkem, Cakir	Assessment of clinical outcomes in renal transplant recipients with COVID-19	2021	Single centre
Yin, S. and Song, T. and Zhong, Q. and Lin, T.	Mortality, risk factors, and treatment of COVID-19 infection in solid organ transplants: A systematic review and meta-analysis	2021	Insufficient original data
Yousefifard, M. and Zali, A. and Zarghi, A. and Madani Neishaboori, A. and Hosseini, M. and Safari, S.	Non-steroidal anti-inflammatory drugs in management of COVID-19; A systematic review on current evidence	2020	Wrong population

Yuan, Q. and Haque, O. and Coe, T. M. and Markmann, J. F.	The Heterogenous Effect of COVID-19 on Liver Transplantation Activity and Waitlist Mortality in the United States	2021	Wrong outcome
Yusuf, A. S. and Cheong, X. K. and Rozita, M. and Periyasamy, P. and Ruslinda, M.	A case of lupus nephritis flare-up in severe COVID-19 infection	2021	n<50
Zanetta, C. and Rocca, M. A. and Filippi, M.	Impact of immunotherapies on COVID-19 outcomes in multiple sclerosis patients	2022	Wrong population
Zargaran, M. and Movassaghi, S. and Seyyedsalehi, M. S. and Zendehdel, K. and Rostamian, A.	Outcomes of coronavirus disease 19 patients with a history of rheumatoid arthritis: A retrospective registry-based study in Iran	2022	n<50
Zarifkar, P and Kamath, A and Robinson, C and Morgulchik, N and Shah, SFH and Cheng, TKM and Dominic, C and Fehintola, AO and Bhalla, G and Ahillan, T	Clinical characteristics and outcomes in patients with COVID-19 and cancer: a systematic review and meta-analysis	2021	Insufficient original data
Zayed, M. and Iohara, K.	Immunomodulation and Regeneration Properties of Dental Pulp Stem Cells: A Potential Therapy to Treat Coronavirus Disease 2019	2020	Wrong population
Zhang, J. and Sheng, H. and Tang, X. and Xia, P. and Li, Z. and Xu, M. and Ma, J. and Shen, Y. and Yu, P. and Liu, X.	Non-steroidal anti-inflammatory drugs and clinical outcomes in patients with COVID-19	2022	Wrong population
Zhou, Q. and Zhao, S. and Gan, L. and Wang, Z. and Peng, S. and Li, Q. and Liu, H. and Liu, X. and Wang, Z. and Shi, Q. and Estill, J. and Luo, Z. and Wang, X. and Liu, E. and Chen, Y.	Use of non-steroidal anti-inflammatory drugs and adverse outcomes during the COVID-19 pandemic: A systematic review and meta-analysis	2022	Wrong population
Zhou, Yangzhong and Ren, Qidong and Chen, Gang and Jin, Qiao and Cui, Quexuan and Luo, Huiting and Zheng, Ke and Qin, Yan and Li, Xuemei	Chronic kidney diseases and acute kidney injury in patients with COVID-19: evidence from a meta-analysis	2020	Wrong population
Zizzo, G. and Tamburello, A. and Castelnovo, L. and Laria, A. and Mumoli, N. and Faggioli, P. M. and Stefani, I. and Mazzone, A.	Immunotherapy of COVID-19: Inside and Beyond IL-6 Signalling	2022	Wrong population
Zuniga, M., Gomes, C., Carsons, S.E., Bender, M.T., Cotzia, P., Miao, Q.R., Lee, D.C. and Rodriguez, A.	Autoimmunity to annexin A2 predicts mortality among hospitalised COVID-19 patients	2021	Wrong population

B. Phase 2 Exclusion Justifications

Authors	Title	Year	Exclusion Factor
Abuhelwa, Z., Alsughayer, A., Abuhelwa, A.Y., Beran, A., Sayeh, W., Khokher, W., Sajdeya, O., Khuder, S. and Assaly, R.	Â In-Hospital Mortality and Morbidity in Cancer Patients with COVID-19: A Nationwide Analysis from the United States	2022	All-cause mortality
Akiyama, Shintaro and Hamdeh, Shadi and Micic, Dejan and Sakuraba, Atsushi	Prevalence and clinical outcomes of COVID-19 in patients with autoimmune diseases: a systematic review and meta-analysis	2022	Systematic Review
Alpert, N., Rapp, J.L., Marcellino, B., Lieberman-Cribbin, W., Flores, R. and Taioli, E	Clinical Course of Cancer Patients with COVID-19: A Retrospective Cohort Study	2021	All-cause mortality
Alpert, N., Rapp, J.L., Marcellino, B., Lieberman-Cribbin, W., Flores, R. and Taioli, E.	Clinical course of cancer patients with COVID-19: a retrospective cohort study	2021	Duplication
Alrashed, F. and Alasfour, H. and Shehab, M.	Impact of biologics and small molecules for inflammatory bowel disease on COVID-19-related hospitalization and mortality: A systematic review and meta-analysis	2021	Systematic Review
Alrashed, F. and Battat, R. and Abdullah, I. and Charabaty, A. and Shehab, M.	Impact of medical therapies for inflammatory bowel disease on the severity of COVID-19: a systematic review and meta-analysis	2021	Systematic Review

Alshaqaq, A., Al Abadi, A., Altheaby, A., Bukhari, M.A., Nasrallah, B., Alamoudi, A., Arabi, Z., Alhejaili, F., Saad, K.B., Busbaih, A. and Idris, M.A.,	Coronavirus disease 2019 and kidney transplantation in Saudi Arabia: outcomes and future opportunities	2021	Insufficient data
Altuntas, Fevzi and Ata, Naim and Yigenoglu, Tugce Nur and BascÄ±, Semih and Dal, Mehmet Sinan and Korkmaz, Serdal and Namdaroglu, Sinem and Basturk, Abdulkadir and HacÄ±bekiroglu, Tuba and Dogu, Mehmet Hilmi	COVID-19 in hematopoietic cell transplant recipients	2021	n<50
Anushiravani, A., Saberzadeh-Ardestani, B., Vahedi, H., Fakheri, H., Mansour-Ghanaei, F., Maleki, I., Nasseri-Moghaddam, S., Vosoghinia, H., Ghadir, M.R., Hormati, A. and Kasaeian, A	Susceptibility of Patients with Inflammatory Bowel Disease to COVID-19 Compared with Their Households	2022	Insufficient data
Ao, G. and Wang, Y. and Qi, X. and Nasr, B. and Bao, M. and Gao, M. and Sun, Y. and Xie, D.	The association between severe or death COVID-19 and solid organ transplantation: A systematic review and meta-analysis	2021	Systematic Review
Ascierto, P.A., Secrest, M.H., Lambert, P., Sarsour, K., Tan, A., Walls, R., Reddy, J., Seetasith, A., Shenison, D., Ngwa, I. and Yun, C.	Mortality of 1,636 COVID-19 cancer patients (pts) and associated prognostic factors	2021	Insufficient data
Avery, Robin K and Chiang, Teresa Poâ€Yu and Marr, Kieren A and Brennan, Daniel C and Sait, Afrah S and Garibaldi, Brian T and Shah, Pali and Ostr and er, Darin and Steinke, Seema Mehta and Permpalung, Nitipong	Inpatient COVID-19 outcomes in solid organ transplant recipients compared to nonâ€solid organ transplant patients: a retrospective cohort	2021	n<50
Axelrad, J.E., Malter, L., Hong, S., Chang, S., Bosworth, B. and Hudesman, D.	From the American epicenter: coronavirus disease 2019 in patients with inflammatory bowel disease in the New York City metropolitan area.Â	2021	Single Centre
Ayala Gutierrez, M.D.M., Rubio-Rivas, M., Romero Gómez, C., Montero Saez, A., Pérez de Pedro, I., Homs, N., Ayuso García, B., Cuenca Carvajal, C., Arnalich Fernández, F., Beato Perez, J.L. and Vargas Nunez, J.A.	On Behalf of The Semi-COVID-Network. Autoimmune Diseases and COVID-19 as Risk Factors for Poor Outcomes: Data on 13,940 Hospitalized Patients from the Spanish Nationwide SEMI-COVID-19 Registry	2021	Systematic Review
Bamias, G. and Kokkotis, G. and Christidou, A. and Christodoulou, D. K. and Delis, V. and Diamantopoulou, G. and Fessatou, S. and Gatopoulou, A. and Giouleme, O. and Kafritsa, P. and Kalantzis, C. and Kapsoritakis, A. and Karatzas, P. and Karmiris, K. and Katsanos, K. and Kevrekidou, P. and Kosmidis, C. and Mantaka, A. and Mathou, N. and Michalopoulos, G. and Michopoulos, S. and Papaconstantinou, I. and Papatheodoridis, G. and Polymeros, D. and Potamianos, S. and Poulopoulos, G. and Protopapas, A. and Sklavaina, M. and Soufleris, K. and Theocharis, G. and Theodoropoulou, A. and Triantafillidis, J. K. and Triantafyllou, K. and Tsiolakidou, G. and Tsironi, E. and Tzouvala, M. and Viazis, N. and Xourgias, V. and Zacharopoulou, E. and Zampeli, E. and Mantzaris, G. J.	The natural history of COVID-19 in patients with inflammatory bowel disease: a nationwide study by the Hellenic Society for the study of IBD	2021	Insufficient data
Banjongjit, A. and Larpparisuth, N. and Phonphok, K. and Homkrailas, P. and Traitanon, O. and Inkong, P. and Wongpraphairot, S. and Lumpaopong, A. and Supaporn, T. and Pongskul, C.	Prognostic Factors for Mortality of COVID-19 Infection in Kidney Transplant Recipients in Thailand: A Nationwide Study	2022	Insufficient data
Banna, G. L. and Cantale, O. and Friedlaender, A. and Yusof, H. and Acharige, S. and Addeo, A.	Risk of SARS-CoV2-Related Mortality in Non-Small Cell Lung Cancer Patients Treated with First-Line Immunotherapy Alone or in Combination with Chemotherapy	2022	Insufficient data

Barlesi, F., Foulon, S., Bayle, A., Gachot, B., Pommeret, F., Willekens, C., Stoclin, A., Merad, M., Griscelliil, F., Micol, J.B. and Sun, R	Outcome of cancer patients infected with COVID-19, including toxicity of cancer research.	2020	Single Centre
Bazgir, N., Taghinezhad, F., Nourmohammadi, H., Azami, G., Ahmadi, I. and Mozafari, A.	Comparing the COVID-19 Mortality Rate in Cancer Patients with and Without a History of Chemotherapy	2022	Single Centre
Bennett, C.L., Ogele, E., Pettit, N.R., Bischof, J.J., Meng, T., Govindarajan, P., Camargo Jr, C.A., Nordenholz, K., Kline, J.A. and RECOVER Investigators	Ã Multicenter Study of Outcomes Among Persons With HIV Who Presented to US Emergency Departments With Suspected SARS-CoV-2	2021	Duplication
Berger, B. and Hazzan, M. and Kamar, N. and Francois, H. and Matignon, M. and Greze, C. and Gatault, P. and Frimat, L. and Westeel, P. F. and Goutaudier, V. and Snanoudj, R. and Colosio, C. and Sicard, A. and Bertr and , D. and Mousson, C. and Bamoulid, J. and Thierry, A. and Anglicheau, D. and Couzi, L. and Chemouny, J. M. and Duveau, A. and Moal, V. and Le Meur, Y. and Blancho, G. and Tourret, J. and Malvezzi, P. and Mariat, C. and Rerolle, J. P. and Bouvier, N. and Caillard, S. and Thaunat, O. and French Solid Organ Transplant, Covid Registry	Absence of Mortality Differences Between the First and Second COVID-19 Waves in Kidney Transplant Recipients	2022	Insufficient data
Berger, J.M., Wohlfarth, P., Königsbrügge, O., Knaus, H.A., Porpaczy, E., Kaufmann, H., Schreiber, J., Mrva-Ghukasyan, T., Winder, T., Severgnini, L. and Wolf, D.,	SARS-CoV-2-related mortality and treatment delays for cancer patients in Austria: Findings of a multicentric nationwide study	2022	Insufficient data
Bertagnolio, S. and Thwin, S. S. and Silva, R. and Nagarajan, S. and Jassat, W. and Fowler, R. and Haniffa, R. and Reveiz, L. and Ford, N. and Doherty, M. and Diaz, J.	Clinical features of, and risk factors for, severe or fatal COVID-19 among people living with HIV admitted to hospital: analysis of data from the WHO Global Clinical Platform of COVID-19	2022	Paediatric
Bertoglio, I.M., Valim, J.M.D.L., Daffre, D., Aikawa, N.E., Silva, C.A., Bonfá, E. and Ugolini-Lopes, M.R.	Poor prognosis of COVID-19 acute respiratory distress syndrome in lupus erythematosus: nationwide cross-sectional population study of 252 119 patients.	2021	Duplication
Bezzio, C. and Armuzzi, A. and Furfaro, F. and Ardizzone, S. and Milla, M. and Carparelli, S. and Orl and o, A. and Caprioli, F. A. and Castiglione, F. and ViganÃ², C. and Ribaldone, D. G. and Zingone, F. and Monterubbianesi, R. and Imperatore, N. and Festa, S. and Daperno, M. and Scucchi, L. and Ferronato, A. and Pastorelli, L. and Balestrieri, P. and Ricci, C. and Cappello, M. and Felice, C. and Fiorino, G. and Saibeni, S.	Therapies for inflammatory bowel disease do not pose additional risks for adverse outcomes of SARS-CoV-2 infection: an IG-IBD study	2021	Insufficient data
Bhogal, T. and Khan, U. T. and Lee, R. and Stockdale, A. and Hesford, C. and Potti-Dhananjaya, V. and Jathanna, A. and Rahman, S. and Tivey, A. and Shotton, R. and Sundar, R. and Valerio, C. and Norouzi, A. and Walker, P. and Suckling, R. and Armstrong, A. and Brearton, G. and Pettitt, A. and Kalakonda, N. and Palmer, D. H. and Jackson, R. and Turtle, L. and Palmieri, C.	Haematological malignancy and nosocomial transmission are associated with an increased risk of death from COVID-19: results of a multi-center UK cohort	2021	Insufficient data
Bondeson, L., Thulin, A., Ny, L., Levin, M., Svensson, J., Lindh, M. and Zhao, Z.	Clinical outcomes in cancer patients with COVID-19 in Sweden	2021	Single Centre
Booth, S. and Curley, H. M. and Varnai, C. and Arnold, R. and Lee, L. Y. W. and Campton, N. A. and Cook, G. and Purshouse, K. and Aries, J. and Innes, A. and Cook, L. B. and Tomkins, O. and Oram, H. S. and Tilby, M. and Kulasekararaj, A. and Wrench, D. and Dolly, S. and Newsom-Davies, T. and Pettengell, R. and Gault, A. and Moody, S. and Mittal, S. and Altohami, M. and Tillet, T. and Illingworth, J. and Mukherjee, L. and Apperly, J. and Ashcroft, J. and	Key findings from the UKCCMP cohort of 877 patients with haematological malignancy and COVID-19: disease control as an important factor relative to recent chemotherapy or anti-CD20 therapy	2022	Insufficient data

Rabin, N. and Carmichael, J. and Cazier, J. B. and Kerr, R. and Middleton, G. and Collins, G. P. and Palles, C.			
Booth, S. and Willan, J. and Wong, H. and Khan, D. and Farnell, R. and Hunter, A. and Eyre, T. and Katz, H. and Dungarwalla, M. and Chen, L. and Browning, J. and Polzella, P. and Gray, N. and Neelakantan, P. and Dhillon, E. K. and Dutton, D. and Sternberg, A. and Prideaux, S. and Collins, G. P. and Peniket, A.	Regional outcomes of severe acute respiratory syndrome coronavirus 2 infection in hospitalised patients with haematological malignancy	2020	Insufficient data
Braunstein, S.L., Lazar, R., Wahnich, A., Daskalakis, D.C. and Blackstock, O.J.	Coronavirus Disease 2019 (COVID-19) Infection Among People With Human Immunodeficiency Virus in New York City: A Population-Level Analysis of Linked Surveillance Data	2021	Paediatric
Breccia, M. and Abruzzese, E. and Accurso, V. and Attolico, I. and Barulli, S. and Bergamaschi, M. and Binotto, G. and Bocchia, M. and Bonifacio, M. and Caocci, G. and Capodanno, I. and Castagnetti, F. and Cavazzini, F. and CrisÃ , E. and Crugnola, M. and Stella De C and ia, M. and Elena, C. and Fava, C. and Galimberti, S. and Gozzini, A. and Gugliotta, G. and Intermesoli, T. and Iurlo, A. and La Barba, G. and Latagliata, R. and Leonetti Crescenzi, S. and Levato, L. and Loglisci, G. and Lucchesi, A. and Luciano, L. and Lunghi, F. and Luzi, D. and Malato, A. and Cristina Miggiano, M. and Pizzuti, M. and Pregno, P. and Rapezzi, D. and Rege-Cambrin, G. and Rosti, G. and Russo, S. and Sancetta, R. and Rita Scortechini, A. and SorÃ , F. and Sportoletti, P. and Stagno, F. and Tafuri, A. and Tiribelli, M. and FoÃ , R. and Saglio, G.	COVID-19 infection in chronic myeloid leukaemia after one year of the pandemic in Italy. A Campus CML report	2023	Insufficient data
Brown, A.E., Croxford, S.E., Nash, S., Khawam, J., Kirwan, P., Kall, M., Bradshaw, D., Sabin, C., Miller, R.F., Post, F.A. and Harding, R.	COVID-19 mortality among people with diagnosed HIV compared to those without during the first wave of the COVID-19 pandemic in England.Â	2022	Paediatric
Bruera, S., Lei, X., Zhao, H., Yazdany, J., Chavez-MacGregor, M., Giordano, S.H. and Suarez-Almazor, M.E.	Risks of mortality and severe coronavirus disease 19 (COVID-19) outcomes in patients with or without systemic lupus erythematosus	2023	2023
Cabello, A., Zamarro, B., Nistal, S., Victor, V., Hernández, J., Prieto-Pérez, L., Carrillo, I., Álvarez, B., Fernández-Roblas, R., Hernández-Segurado, M. and Becares, J.	COVID-19 in people living with HIV: A multicenter case-series study	2021	Duplication
Caillard, S. and Anglicheau, D. and Matignon, M. and Durrbach, A. and Greze, C. and Frimat, L. and Thaunat, O. and Legris, T. and Moal, V. and Westeel, P. F. and Kamar, N. and Gatault, P. and Snanoudj, R. and Sicard, A. and Bertr and , D. and Colosio, C. and Couzi, L. and Chemouny, J. M. and Masset, C. and Blancho, G. and Bamoulid, J. and Duveau, A. and Bouvier, N. and Chavarot, N. and Grimbert, P. and Moulin, B. and Le Meur, Y. and Hazzan, M. and French, S. O. T. Covid Registry	An initial report from the French SOT COVID Registry suggests high mortality due to Covid-19 in recipients of kidney transplants	2020	Insufficient data
Caillard, S. and Chavarot, N. and Francois, H. and Matignon, M. and Snanoudj, R. and Tourret, J. and Greze, C. and Thaunat, O. and Frimat, L. and Westeel, P. F. and Gatault, P. and Masset, C. and Blancho, G. and Legris, T. and Moal, V. and Kamar, N. and Jdidou, M. and Colosio, C. and Mousson, C. and Goutadier, V. and Sicard, A. and Bertr and , D. and Bamoulid, J. and Malvezzi, P. and Couzi, L. and Chemouny, J. M. and Duveau, A. and Mariat, C. and Rerolle, J. P. and Thierry, A. and Bouvier, N. and Anglicheau, D. and Le Meur, Y. and Hazzan, M. and Moulin, B. and Fafi-Kremer, S. and Hertig, A. and Barrou, B. and Morelon, E. and Merville, P. and Westeel, P. F. and Jaureguy, M. and Ducloux, D. and Tsimaratos, M. and Garaix-Gilardo, F. and Dumortier, J. and Mussot, S. and Roux, A. and Sebbag, L. and	Clinical Utility of Biochemical Markers for the Prediction of COVID-19-Related Mortality in Kidney Transplant Recipients	2021	Insufficient data

Rondeau, E. and Buchler, M. and Augusto, J. F. and Vigneau, C. and Morin, M. C. and Chemouny, J. and Golbin, L. and Grimbert, P. and Durrbach, A. and Schvartz, B. and Le Quintrec, M. and Rerolle, J. P. and Heng, A. E. and Garrouste, C. and Coponat, H. V. and Epailly, E. and Brugiere, O. and Dharancy, S. and Salame, E. and Saliba, F.			
Caillard, S., Thaunat, O. and Hazzan, M.	Covid-19 in kidney transplantation: Lessons from the French Registry	2021	Duplication
Calderón-Parra, J., Cuervas-Mons, V., Moreno-Torres, V., Rubio-Rivas, M., Agudo-de Blas, P., Pinilla-Llorente, B., Helguera-Amezua, C., Jiménez-García, N., Pesqueira-Fontan, P.M., Méndez-Bailón, M. and Artero, A	Influence of chronic use of corticosteroids and calcineurin inhibitors on COVID-19 clinical outcomes: analysis of a nationwide registry	2022	All-cause mortality
Candellier, A. and Jean Goffin, E. and Vart, P. and Noordzij, M. and Arnol, M. and Covic, A. and Lentini, P. and Malik, S. and Reichert, L. and Sever, M. S. and Watschinger, B. and Jager, K. J. and Gansevoort, R.	COVID-19 related mortality in kidney transplant and dialysis patients: A comparative, prospective registry based study	2020	Insufficient data
Cao, C. and Gan, X. and Hu, X. and Su, Y. and Zhang, Y. and Peng, X.	Association of active immunotherapy with outcomes in cancer patients with COVID-19: a systematic review and meta-analysis	2022	Systematic Review
Chanda, D., Minchella, P.A., Kampamba, D., Itoh, M., Hines, J.Z., Fwoloshi, S., Boyd, M.A., Hamusonde, K., Chirwa, L., Nikoi, K. and Chirwa, R.	COVID-19 severity and COVID-19-associated deaths among hospitalized patients with HIV infectionâ€“Zambia,	2021	Paediatric
Chauhan, S., Meshram, H.S., Kute, V.B., Patel, H., Deshmukh, S., Desai, S., Dave, R. and Banerjee, S.	Comparative Analysis of Kidney Transplant Recipients with Severe Acute Respiratory Syndrome Coronavirus 2 Compared with Nonkidney Transplant	2022	Single Centre
Creemers, R.H., Rezazadeh Ardabili, A., Jonkers, D.M., Leers, M.P., Romberg-Camps, M.J., Pierik, M.J. and van Bodegraven, A.A	Severe COVID-19 in inflammatory bowel disease patients in a population-based setting	2021	Insufficient data
D'Silva, K.M., Jorge, A., Cohen, A., McCormick, N., Zhang, Y., Wallace, Z.S. and Choi, H.K	COVID-19 outcomes in patients with systemic autoimmune rheumatic diseases compared to the general population: a US multicenter, comparative cohort study.	2021	Duplication
Dachi, D. and Geiger, G. and Montgomery, M. W. and Karmen-Tuohy, S. and Golzy, M. and Antar, A. A. R. and Llibre, J. M. and Camazine, M. and DÃaz-De Santiago, A. and Carlucci, P. M. and Zacharioudakis, I. M. and Rahimian, J. and Wanjalla, C. N. and Slim, J. and Arinze, F. and Kratz, A. M. P. and Jones, J. L. and Patel, S. M. and Kitchell, E. and Francis, A. and Ray, M. and Koren, D. E. and Baddley, J. W. and Hill, B. and Sax, P. E. and Chow, J.	Characteristics, Comorbidities, and Outcomes in a Multicenter Registry of Patients With Human Immunodeficiency Virus and Coronavirus Disease 2019	2021	Insufficient data
Damiani, G., Pacifico, A., Bragazzi, N.L. and Malagoli, P	Biologics increase the risk of SARS-CoV-2 infection and hospitalization, but not ICU admission and death: Real-life data from a large cohort during red-zone declaration	2020	Single Centre
Davies, M.A.	HIV and risk of COVID-19 death: a population cohort study from the Western Cape Province, South Africa.	2020	Duplication
de Medeiros, K. S. and da Silva, L. A. S. and MacÃªdo, L. T. A. and Sarmento, A. C. and Costa, A. P. F. and EleutÃ©rio, J., Jr. and GonÃ§alves, A. K.	Potential impact of the COVID-19 in HIV-infected individuals: a systematic review Impact of the	2021	Systematic Review

	COVID-19 in HIV-Infected Individuals		
Del Amo, J. and Polo, R. and Moreno, S. and DÃaz, A. and MartÃnez, E. and Arribas, J. R. and JarrÃn, I. and HernÃ¡n, M. A.	Incidence and Severity of COVID-19 in HIV-Positive Persons Receiving Antiretroviral Therapy : A Cohort Study	2022	Insufficient data
Del Amo, J. and Polo, R. and Moreno, S. and MartÃ-nez, E. and Cabello, A. and Iribarren, J. A. and Curran, A. and MacÃas, J. and Montero, M. and DueÃ±as, C. and MariÃ±o, A. I. and de la CÃ¡mara, S. P. and DÃaz, A. and Arribas, J. R. and JarrÃn, I. and HernÃ¡n, M. A.	Tenofovir disoproxil fumarate/emtricitabine and severity of coronavirus disease 2019 in people with HIV infection	2022	Insufficient data
Derikx, L.A., Lantinga, M.A., de Jong, D.J., van Dop, W.A., Creemers, R.H., Römkens, T.E., Jansen, J.M., Mahmmod, N.	Clinical Outcomes of Covid-19 in Patients With Inflammatory Bowel Disease: A Nationwide Cohort Study	2021	Insufficient data
Desai, Aakash and Gupta, Rohit and Advani, Shailesh and Ouellette, Lara and Kuderer, Nicole M and Lyman, Gary H and Li, Ang	Mortality in hospitalized patients with cancer and coronavirus disease 2019: a systematic review and metaâ€□analysis of cohort studies	2021	Systematic Review
Dulery, R. and Lamure, S. and Delord, M. and Di Blasi, R. and Chauchet, A. and Hueso, T. and Rossi, C. and Drenou, B. and Deau Fischer, B. and Soussain, C. and Feugier, P. and NoÃ«l, N. and Choquet, S. and Bologna, S. and Joly, B. and Philippe, L. and Kohn, M. and Malak, S. and Fouquet, G. and Daguindau, E. and Taoufik, Y. and Lacombe, K. and Cartron, G. and ThiÃ©blemont, C. and Besson, C.	Prolonged in-hospital stay and higher mortality after Covid-19 among patients with non-Hodgkin lymphoma treated with B-cell depleting immunotherapy	2021	Insufficient data
Durstenfeld, M.S., Sun, K., Ma, Y., Rodriguez, F., Secemsky, E.A., Parikh, R.V. and Hsue, P.Y	Impact of HIV Infection on COVID-19 Outcomes Among Hospitalized Adults in the U.S.	2021	Duplication
Elias, Michelle and Pievani, Daniele and R and oux, Christine and Louis, Kevin and Denis, Bl and ine and Delion, Alex and ra and Le Goff, OcÃ©ane and Antoine, Corinne and Greze, Clarisse and Pillebout, Evangeline	COVID-19 infection in kidney transplant recipients: disease incidence and clinical outcomes	2020	Insufficient data
Engl and , B. R. and Roul, P. and Yang, Y. and Kalil, A. C. and Michaud, K. and Thiele, G. M. and Sauer, B. C. and Baker, J. F. and Mikuls, T. R.	Risk of COVID-19 in Rheumatoid Arthritis: A National Veterans Affairs Matched Cohort Study in At-Risk Individuals	2021	Compound outcome
England, B.R., Roul, P., Yang, Y., Kalil, A.C., Michaud, K., Thiele, G.M., Sauer, B.C., Baker, J.F. and Mikuls, T.R	Risk of COVID-19 in rheumatoid arthritis: a national veterans affairs matched cohort study in at-risk individuals.Â	2021	Compound outcome
Eybpoosh, S., Afshari, M., Haghdoost, A.A., Kazerooni, P.A., Gouya, M.M. and Tayeri, K.	Severity and mortality of COVID-19 infection in HIV - infected individuals: Preliminary findings from Iran.	2021	Insufficient data
Favara, G. and Barchitta, M. and Maugeri, A. and Faro, G. and Agodi, A.	HIV infection does not affect the risk of death of COVID-19 patients: A systematic review and meta-analysis of epidemiological studies	2022	Systematic Review
Faye, A.S., Lee, K.E., Laszkowska, M., Kim, J., Blackett, J.W., McKenney, A.S., Krigel, A., Giles, J.T., Wang, R., Bernstein, E.J. and Green, P.H	Risk of adverse outcomes in hospitalized patients with autoimmune disease and COVID-19: a matched cohort study from New York City	2021	Single Centre
Ferri, C. and Raimondo, V. and Gragnani, L. and Giuggioli, D. and Dagna, L. and Tavoni, A. and Ursini, F. and L'Andolina, M. and Caso, F. and Ruscitti, P. and Caminiti, M. and Foti, R. and Riccieri, V. and Guiducci, S. and Pellegrini, R. and Zanatta, E. and Varcasia, G. and Olivo, D. and Gigliotti, P. and	LONG-TERM SURVEY STUDY of the IMPACT of COVID-19 on SYSTEMIC AUTOIMMUNE DISEASES. LOW DEATH RATE DESPITE the	2022	Insufficient data

Cuomo, G. and Murdaca, G. and Cecchetti, R. and De Angelis, R. and Romeo, N. and Ingegnoli, F. and Cozzi, F. and Codullo, V. and Cavazzana, I. and Colaci, M. and Abignano, G. and De Santis, M. and Lubrano, E. and Fusaro, E. and Spinella, A. and Lumetti, F. and De Luca, G. and Bell and o R and one, S. and Visalli, E. and Dal Bosco, Y. and Amato, G. and Giannini, D. and Bilia, S. and Masini, F. and Pellegrino, G. and Pigatto, E. and Generali, E. and Pagano Mariano, G. and Pettiti, G. and Zanframundo, G. and Brittelli, R. and Aiello, V. and Caminiti, R. and Scorpiniti, D. and Ferrari, T. and Campochiaro, C. and Brusi, V. and Fredi, M. and Moschetti, L. and Cacciapaglia, F. and Ferrari, S. M. and Di Cola, I. and Vadacca, M. and Lorusso, S. and Monti, M. and Lorini, S. and Paparo, S. R. and Ragusa, F. and Elia, G. and Mazzi, V. and Aprile, M. L. and Tasso, M. and Miccoli, M. and Bosello, S. L. and D'Angelo, S. and Doria, A. and Franceschini, F. and Meliconi, R. and Matucci-Cerinic, M. and Iannone, F. and Giacomelli, R. and Salvarani, C. and Zignego, A. L. and Fallahi, P. and Antonelli, A.	INCREASED PREVALENCE of SYMPTOMATIC INFECTION. ROLE of PRE-EXISTING INTERSTITIAL LUNG DISEASE and ONGOING TREATMENTS		
Fisher, A.M., Schlauch, D., Mulloy, M., Dao, A., Reyad, A.I., Correll, M., Fromell, G.J., Pittman, J., Bingaman, A.W., Sankarapandian, B. and Allam, S.R.	Outcomes of COVID-19 in hospitalized solid organ transplant recipients compared to a matched cohort of non-transplant pa- tients at a national healthcare system in the United States	2021	Duplication
Flannery, S., Schwartz, R., Rasul, R., Hirschwerk, D.A., Wallach, F., Hirsch, B. and McGowan, J.,	A comparison of COVID-19 inpatients by HIV status.	2021	Duplication
Gagliardini, R., Vergori, A., Lorenzini, P., Cicalini, S., Pinnetti, C., Mazzotta, V., Mondi, A., Mastrorosa, I., Camici, M., Lanini, S. and Fusto, M.	Characteristics and outcomes of COVID-19-related hospitalization among PLWH	2022	Insufficient data
GarcÃa-SuÃ¡rez, Julio and De La Cruz, Javier and Cedillo, Ã□ngel and Llamas, Pilar and Duarte, Rafael and JimÃ©nez-Yuste, VÃctor and HernÃ¡ndez-Rivas, JosÃ© Ã□ngel and Gil-Manso, Rodrigo and Kwon, Mi and SÃ¡nchez-Godoy, Pedro	Impact of hematologic malignancy and type of cancer therapy on COVID-19 severity and mortality: lessons from a large population-based registry study	2020	Insufficient data
Garnica, M. and De Queiroz Crusoe, E. and Ribeiro, G. and Bittencourt, R. and Magalhaes, R. J. P. and Zanella, K. R. and Neto, A. E. H. and Lima, J. and Sola, C. and Souza, E. G. and Magalhaes, A. and Maiolino, A. and Hungria, V.	COVID-19 in multiple myeloma patients: Frequencies and risk factors for hospitalization, ventilatory support, intensive care admission and mortality -cooperative registry from grupo brasileiro de mieloma multiplo (GBRAM)	2023	2023
Genuardi, Michael V and Moss, Noah and Najjar, Samer S and Houston, Brian A and Shore, Supriya and Vorovich, Esther and Atluri, Pavan and Molina, Maria and Chambers, Susan and Sharkoski, Tiffany	Coronavirus disease 2019 in heart transplant recipients: Risk factors, immunosuppression, and outcomes	2021	Insufficient data
Gerard, A. O. and Barbosa, S. and Anglicheau, D. and Couzi, L. and Hazzan, M. and Thaunat, O. and Blancho, G. and Caillard, S. and Sicard, A.	Association Between Maintenance Immunosuppressive Regimens and COVID-19 Mortality in Kidney Transplant Recipients	2020	Insufficient data
Giannakoulis, V.G., Papoutsi, E. and Siempos, I.I.	Effect of cancer on clinical outcomes of patients with COVID-19: a meta-analysis of patient data' - meta analysis.	2020	Systematic Review
Giannakoulis, Vassilis G and Papoutsi, Eleni and Siempos, Ilias I	Effect of cancer on clinical outcomes of patients with COVID-19: a meta-analysis of patient data	2020	Duplication
Gisondi, P., Zaza, G., Del Giglio, M., Rossi, M., Iacono, V. and Girolomoni, G.	Risk of hospitalization and death from COVID-19	2020	Single Centre

	infection in patients with chronic plaque psoriasis receiving a biologic treatment and renal transplant recipients in maintenance immunosuppressive treatment.		
Goffin, Eric and C and ellier, Alex and re and Vart, Priya and Noordzij, Marlies and Arnol, Miha and Covic, Adrian and Lentini, Paolo and Malik, Shafi and Reichert, Louis J and Sever, Mehmet S	COVID-19-related mortality in kidney transplant and haemodialysis patients: a comparative, prospective registry-based study	2021	Insufficient data
Hadi, Y.B., Naqvi, S.F., Kupec, J.T. and Sarwari, A.R	Characteristics and outcomes of COVID-19 in patients with HIV: a multicentre research network study	2020	Duplication
Han, X. and Hou, H. and Xu, J. and Ren, J. and Li, S. and Yang, H. and Wang, Y.	Significant association between HIV infection and increased risk of COVID-19 mortality: a meta-analysis based on adjusted effect estimates	2021	Systematic Review
Hariyanto, T. I. and Kurniawan, A.	MO33-5 The impact of chemotherapy for cancer patients with COVID-19 on severity and mortality outcomes: A meta-analysis	2021	Insufficient data
Hariyanto, T. I. and Rosalind, J. and Christian, K. and Kurniawan, A.	Human immunodeficiency virus and mortality from coronavirus disease 2019: A systematic review and meta-analysis	2021	Systematic Review
Hasseli, R. and Pfeil, A. and Hoyer, B. F. and Krause, A. and Lorenz, H. M. and Richter, J. G. and Schmeiser, T. and Voll, R. E. and Schulze-Koops, H. and Specker, C. and MÃ¼ller-Ladner, U.	Do patients with rheumatoid arthritis show a different course of COVID-19 compared to patients with spondyloarthritis?	2021	Insufficient data
He, W., Chen, L., Chen, L., Yuan, G., Fang, Y., Chen, W., Wu, D., Liang, B., Lu, X., Ma, Y. and Li, L	COVID-19 in persons with haematological cancers	2020	Insufficient data
Heidary, M. and Asadi, A. and Noorbakhsh, N. and Dashtbin, S. and Asadollahi, P. and Dranb and i, A. and Navidifar, T. and Ghanavati, R.	COVID-19 in HIV-positive patients: A systematic review of case reports and case series	2022	Systematic Review
Heldman, M. R. and Kates, O. S. and Rakita, R. M. and Lease, E. D. and Limaye, A. P. and Fisher, C. E.	Delayed Mortality among Solid Organ Transplant Recipients Hospitalized for Covid-19: An International Multicenter Study	2021	Insufficient data
Heldman, Madeleine R and Kates, Olivia S and Safa, Kassem and Kotton, Camille N and Georgia, Sarah J and Steinbrink, Julie M and Alex and er, Barbara D and Hemmersbachâ€Miller, Marion and Blumberg, Emily A and Multani, Ashrit	Changing trends in mortality among solid organ transplant recipients hospitalized for COVID-19 during the course of the pandemic	2022	Insufficient data
Hilbr and s, L. B. and Duivenvoorden, R. and Vart, P. and Franssen, C. F. M. and Hemmelder, M. H. and Jager, K. J. and Kieneker, L. M. and Noordzij, M. and Pena, M. J. and de Vries, H. and Arroyo, D. and Covic, A. and Crespo, M. and Goffin, E. and Islam, M. and Massy, Z. A. and Montero, N. and Oliveira, J. P. and Munoz, A. R. and Sanchez, J. E. and Sridharan, S. and Winzeler, R. and Gansevoort, R. T. and van der Net, J. B. and Essig, M. and du Buf-Vereijken, P. W. G. and van Ginneken, B. and Maas, N. and Vogt, L. and van Jaarsveld, B. C. and Bemelman, F. J. and Klingenberg-Salahova, F. and Heenan-Vos, F. and Vervloet, M. G. and Nurmohamed, A. and Abramowicz, D. and Verhofstede, S. and Maoujoud, O. and Fialova, J. and Melilli, E. and Fava, A. and Cruzado, J. M. and Lips, J. and Hengst, M. and Gellert, R. and Rydzewski, A. and Alferes, D. G. and Rychlik, I. and Zakharova, E. V. and Ambuehl, P. M. and Lepeytre,	COVID-19-related mortality in kidney transplant and dialysis patients: Results of the ERACODA collaboration	2020	Insufficient data

F. and Rabate, C. and Rostoker, G. and Marques, S. and Azasevac, T. and Katicic, D. and ten Dam, M. and Kruger, T. and Logtenberg, S. J. J. and Fricke, L. and van Zanen, A. L. and Slebe, J. J. P. and Kemlin, D. and van de Wetering, J. and Eiselt, J. and Kielberger, L. and El-Wakil, H. S. and ElHafeez, S. A. and Canal, C. and Facundo, C. and Ramos, A. M. and Debska-Slizien, A. and Veldhuizen, N. M. H. and Panagoutsos, S. and Matceac, I. and Nistor, I. and Cordos, M. and Groeneveld, J. H. M. and van Buren, M. and Diekmann, F. and Ferreira, A. C. and Santos, A. C. S. and Arias-Cabrales, C. and Llinas-Mallol, L. and Buxeda, A. and Tarrega, C. B. and Redondo-Pachon, D. and Jimenez, M. D. A. and Hofstra, J. M. and Franco, A. and Rodriguez-Ferrero, M. L. and Manzanos, S. B. and de Arriba, G. and Barrios, R. H. S. and Bartelet, K. and Demir, E. and Holl and er, D. A. M. J. and Kerckhoffs, A. and Buttner, S. and de Vries, A. P. J. and Meziyerh, S. and van der Helm, D. and Reinders, M. and Bouwsma, H. and Petruliene, K. and Maloney, S. and Verberk, I. and Di Luca, M. and Tuglular, S. Z. and Beerenhout, C. and Luik, P. T. and Kerschbaum, J. and Tiefenthaler, M. and Watschinger, B. and Adema, A. Y. and Stepanov, V. A. and Zulkarnaev, A. B. and Turkmen, K. and Decenzio, B. and Fliedner, A. and Miyasato, H. and Asberg, A. and Mjoen, G. and Pini, S. and de Biase, C. and van de Logt, A. E. and Maas, R. and Lebedeva, O. and Lopez, V. and Reichert, L. J. M. and Verhave, J. and Titov, D. and Parshina, E. V. and van Gils-Verrij, L. E. A. and de Bruin, C. J. R. and Harty, J. C. and Meurs, M. and Myslak, M. and Battaglia, Y. and Lentini, P. and den Deurwaarder, E. and Rahimzadeh, H. and Schouten, M. and Cabezas-Reina, C. J. and Diaz-Mareque, A. and Coca, A. and Meijers, B. K. I. and Naesens, M. and Kuypers, D. and Desschans, B. and Tonnerlier, A. and Wissing, K. M. and Dedinska, I. and Pessolano, G. and van der S and e, F. M. and Christiaans, M. H. L. and G and olfini, I. and Maggiore, U. and Kanaan, N. and Labriola, L. and Devresse, A. and Malik, S. and Berger, S. P. and Meijer, E. and S and ers, J. S. F. and Ponikvar, J. B. and Abrahams, A. C. and Molenaar, F. M. and van Zuilen, A. D. and Meijvis, S. C. A. and Dolmans, H. and Zanoli, L. and Marcantoni, C. and Esposito, P. and Krzesinski, J. M. and Barahira, J. D. and Gallieni, M. and Sabiu, G. and Martin-Moreno, P. L. and Guglielmetti, G. and Guzzo, G. and Luik, A. J. and van Kuijk, W. H. M. and Stikkelbroeck, L. W. H. and Hermans, M. M. H. and Rimsevicius, L. and Righetti, M. and Heitink-Ter Braak, N.			
Hoffmann, C. and Casado, J. L. and HÃ¤rter, G. and Vizcarra, P. and Moreno, A. and Cattaneo, D. and Meraviglia, P. and Spinner, C. D. and Schabaz, F. and Grunwald, S. and Gervasoni, C.	Immune deficiency is a risk factor for severe COVID-19 in people living with HIV	2021	Insufficient data
Ilonze, Onyedika J and Ballut, Kareem and Rao, Roopa S and Jones, Mark A and Guglin, Maya	SARS-CoV-2 infection in heart transplant recipients: a systematic literature review of clinical outcomes and immunosuppression strategies	2021	Systematic Review
Jager, K. J. and Kramer, A. and Chesnaye, N. C. and Couchoud, C. and Sanchez-Alvarez, J. E. and Garneata, L. and Collart, F. and Hemmelder, M. H. and Ambuhl, P. and Kerschbaum, J. and Legeai, C. and Del Pino, Y. Pino M. D. and Mircescu, G. and Mazzoleni, L. and Hoekstra, T. and Winzeler, R. and Mayer, G. and Stel, V. S. and Wanner, C. and Zoccali, C. and Massy, Z. A.	Results from the ERA-EDTA Registry indicate a high mortality due to COVID-19 in dialysis patients and kidney transplant recipients across Europe	2020	Paediatric
Jassat, W., Mudara, C., Ozougwu, L., Welch, R., Arendse, T., Masha, M., Blumberg, L., Kufa, T., Puren, A., Groome, M. and Govender, N.	Trends in COVID-19 Admissions and Deaths Among People Living with HIV in South Africa	2023	2023

Jering, K. S. and McGrath, M. M. and Mc Causl and , F. R. and Claggett, B. and Cunningham, J. W. and Solomon, S. D.	Excess mortality in solid organ transplant recipients hospitalized with COVID-19: A large-scale comparison of SOT recipients hospitalized with or without COVID-19	2022	Insufficient data
Johnston, R.	The first 6 months of HIV-SARS-CoV-2 coinfection: outcomes for 6947 individuals	2021	Systematic Review
Jung, Y., Kwon, M. and Choi, H.G., 2021. Association between previous rheumatoid arthritis and COVID-19 and its severity: a nationwide cohort study in South Korea.	Association between previous rheumatoid arthritis and COVID-19 and its severity: a nationwide cohort study in South Korea	2021	Paediatric
Kamal, M. and Baudo, M. and Shmushkevich, S. and Geng, Y. and Rahouma, M.	Early mortality following COVID-19 infection among cancer patients who received radiotherapy: A meta-analysis	2023	2023
Kaplan-Lewis, E. and Banga, J. and Khan, M. and Casey, E. and Mazumdar, M. and Bratu, S. and Abdallah, M. and Pitts, R. and Leider, J. and Hennessey, K. and Cohen, G. M. and Clel and , C. M. and Salama, C.	HIV Diagnosis and the Clinical Course of COVID-19 Among Patients Seeking Care Within the New York City Public Hospital System During the Initial Pandemic Peak	2021	All-cause mortality
Kaplan-Lewis, E., Banga, J., Khan, M., Casey, E., Mazumdar, M., Bratu, S., Abdallah, M., Pitts, R., Leider, J., Hennessey, K. and Cohen, G.M.	.HIV Diagnosis and the Clinical Course of COVID-19 Among Patients Seeking Care Within the New York City Public Hospital System During the Initial Pandemic Peak.Â	2021	Duplication
Kates, Olivia S and Haydel, Br and y M and Florman, S and er S and Rana, Meenakshi M and Chaudhry, Zohra S and Ramesh, Mayur S and Safa, Kassem and Kotton, Camille Nelson and Blumberg, Emily A and Besharatian, Behdad D	Coronavirus disease 2019 in solid organ transplant: a multicenter cohort study	2021	Insufficient data
Khusid, J.A., Becerra, A.Z., Gallante, B., Sadiq, A.S., Atallah, W.M., Badani, K.K. and Gupta, M.	Cancer, mortality, and acute kidney injury among hospitalized patients with SARS-CoV-2 infection	2021	All-cause mortality
Kjeldsen, S., Nielsen, J., Mertz Nørgård, B. and Kjeldsen, J.,	Mesalazine in inflammatory bowel disease and COVID-19: hospitalization and adverse in-hospital outcomes based on nationwide data	2022	Insufficient data
Klebanov, N., Pahalyants, V., Murphy, W.S., Theodosakis, N., Zubiri, L., Klevens, R.M., Kwatra, S.G., Lilly, E., Reynolds, K.L. and Semenov, Y.R.	Risk of COVID-19 in patients with cancer receiving immune checkpoint inhibitors	2021	Insufficient data
Koren, J. and Steinerova, K. and Janikova, A. and Belada, D. and Hajkova, B. and Krcmeryova, M. and Hanackova, V. and Vackova, B. and Jindra, P. and Osovska, M. and Svobodova, E. and Dlouha, L. and Vodicka, P. and Trneny, M.	Multicenter retrospective analysis of risk factors for mortality of COVID-19 infection in patients with lymphoma	2021	Insufficient data
Kowalska, J. D. and Lara, M. and Hlebowicz, M. and Mularska, E. and JabÅ‚onowska, E. and Siwak, E. and W and aÅ‚owicz, A. and Witak-JÄ™dra, M. and Olczak, A. and BociÄ…ga-Jasik, M. and Suchacz, M. and Stempkowska-Rejek, J. and Wasilewski, P. and Parczewski, M.	Non-HIV-related comorbidities and uncontrolled HIV replication are independent factors increasing the odds of hospitalization due to COVID-19 among HIV-positive patients in Poland	2023	2023
Kremer, Daan and Pieters, Tobias T and Verhaar, Marianne C and Berger, Stefan P and Bakker, Stephan JL and van Zuilen, Arjan D and Joles, Jaap A and Vernooij, Robin WM and van Balkom, Bas WM	A systematic review and metaâ€□analysis of COVID-19 in kidney transplant recipients: lessons to be learned	2021	Systematic Review

Kridin, K. and Schonmann, Y. and Damiani, G. and Peretz, A. and Onn, E. and Bitan, D. T. and Cohen, A. D.	Tumor necrosis factor inhibitors are associated with a decreased risk of COVID-19-associated hospitalization in patients with psoriasis-A population-based cohort study	2021	Insufficient data
Kridin, K. and Schonmann, Y. and Solomon, A. and Damiani, G. and Tzur Bitan, D. and Onn, E. and Weinstein, O. and Cohen, A. D.	Risk of COVID-19 infection, hospitalization, and mortality in patients with psoriasis treated by interleukin-17 inhibitors	2022	Insufficient data
Kridin, K. and Schonmann, Y. and Tzur Bitan, D. and Damiani, G. and Peretz, A. and Weinstein, O. and Cohen, A. D.	Coronavirus Disease 2019 (COVID-19)-Associated Hospitalization and Mortality in Patients with Psoriasis: A Population-Based Study	2021	Insufficient data
Kridin, K., Schonmann, Y., Solomon, A., Damiani, G., Tzur Bitan, D., Onn, E., Weinstein, O. and Cohen, A.D.	Risk of covid-19 infection, hospitalization, and mortality in patients with psoriasis treated by interleukin-17 inhibitors.	2022	Insufficient data
Lamure, S. and DulÃ©ry, R. and Di Blasi, R. and Chauchet, A. and Laureana, C. and Deau-Fischer, B. and Drenou, B. and Soussain, C. and Rossi, C. and NoÃ«l, N. and Choquet, S. and Bologna, S. and Joly, B. and Kohn, M. and Malak, S. and Fouquet, G. and Daguindau, E. and Bernard, S. and ThiÃ©blemont, C. and Cartron, G. and Lacombe, K. and Besson, C.	Determinants of outcome in Covid-19 hospitalized patients with lymphoma: A retrospective multicentric cohort study	2020	Insufficient data
Lee, K. W. and Yap, S. F. and Ngeow, Y. F. and Lye, M. S.	COVID-19 in People Living with HIV: A Systematic Review and Meta-Analysis	2021	Systematic Review
Lee, L. Y. W. and Cazier, J. B. and Angelis, V. and Arnold, R. and Bisht, V. and Campton, N. A. and Chackathayil, J. and Cheng, V. W. T. and Curley, H. M. and Fittall, M. W. and Freeman-Mills, L. and Gennatas, S. and Goel, A. and Hartley, S. and Hughes, D. J. and Kerr, D. and Lee, A. J. X. and Lee, R. J. and McGrath, S. E. and Middleton, C. P. and Murugaesu, N. and Newsom-Davis, T. and Okines, A. F. C. and Olsson-Brown, A. C. and Palles, C. and Pan, Y. and Pettengell, R. and Powles, T. and Protheroe, E. A. and Purshouse, K. and Sharma-Oates, A. and Sivakumar, S. and Smith, A. J. and Starkey, T. and Turnbull, C. D. and Varnai, C. and Yousaf, N. and Kerr, R. and Middleton, G.	COVID-19 mortality in patients with cancer on chemotherapy or other anticancer treatments: A prospective cohort study	2020	Insufficient data
Lee, M.J., Snell, L.B., Douthwaite, S.T., Fidler, S., Fitzgerald, N., Goodwin, L., Hamzah, L., Kulasegaram, R., Lawrence, S., Lwanga, J. and Marchant, R.	Clinical outcomes of patients with and without HIV hospitalized with COVID-19 in EnglandÂ	2022	Duplication
Lee, M.J., Snell, L.B., Douthwaite, S.T., Fidler, S., Fitzgerald, N., Goodwin, L., Hamzah, L., Kulasegaram, R., Lawrence, S., Lwanga, J. and Marchant, R.	Clinical outcomes of patients with and without HIV hospitalized with COVID-19 in England during the early stages of the pandemic: a matched retrospective multi-centre analysis (RECEDE-C19 study)	2022	Duplication
Legeai, C. and Jasseron, C. and Cantrelle, C. and Varnous, S. and Para, M. and Epailly, E. and Guendouz, S. and Sebbag, L. and Guillemain, R. and Vermes, E. and Kerbaul, F. and Dorent, R.	Death Rate in Heart Transplant Recipients during the COVID-19 Outbreak in France	2021	Insufficient data
Lerner, A. H. and Arvanitis, P. and Vieira, K. and Klein, E. J. and Farmakiotis, D.	mRNA Vaccination Decreases COVID-19-Associated Morbidity and Mortality Among Organ Transplant Recipients: A Contemporary Cohort Study	2022	Insufficient data
Lerner, A. H. and Klein, E. and Farmakiotis, D.	Mortality in organ transplant recipients with COVID-19 compared to	2021	Insufficient data

	non-transplant or waitlisted patients: A meta-analysis		
Leuva, H., Zhou, M., Brau, N., Brown, S.T., Mundi, P., Rosenberg, T.C.M., Luhrs, C., Bates, S.E., Park, Y.H.A. and Fojo, T.,	Influence of cancer on COVID-19 incidence, outcomes, and vaccine effectiveness: A Prospective Cohort Study of US Veterans	2022	All-cause mortality
Li, H. and Wallace, Z. S. and Sparks, J. A. and Lu, N. and Wei, J. and Xie, D. and Wang, Y. and Zeng, C. and Lei, G. and Zhang, Y.	Risk of COVID-19 Among Unvaccinated and Vaccinated Patients With Rheumatoid Arthritis: A General Population Study	2023	2023
Li, J., Tian, A., Yang, D., Zhang, M., Chen, L., Wen, J. and Chen, P.	Celiac disease and the susceptibility of COVID-19 and the risk of severe COVID-19: a Mendelian randomization study	2022	Insufficient data
Liang, M. and Luo, N. and Chen, M. and Chen, C. and Singh, S. and Singh, S. and Tan, S.	Prevalence and Mortality due to COVID-19 in HIV Co-Infected Population: A Systematic Review and Meta-Analysis	2021	Systematic Review
Liang, W., Guan, W., Chen, R., Wang, W., Li, J., Xu, K., Li, C., Ai, Q., Lu, W., Liang, H. and Li, S	Cancer patients in SARS-CoV-2 infection: a nationwide analysis in China.	2020	Insufficient data
Liu, M. and Wang, H. and Liu, L. and Cui, S. and Huo, X. and Xiao, Z. and Zhao, Y. and Wang, B. and Zhang, G. and Wang, N.	Risk of COVID-19 infection, hospitalization and mortality in psoriasis patients treated with interleukin-17 inhibitors: A systematic review and meta-analysis	2022	Systematic Review
Lopez, V. and Vazquez, T. and Casas, C. and Hibrovo, R. and Hern and ez, D.	Risk factors for mortality in kidney transplant patients infected by sars-cov-2 in south of Spain	2021	Insufficient data
Lova Sun	Rates of COVID-19-related Outcomes in Cancer compared to non-Cancer Patients	2020	Duplication
Ludvigsson, J.F., Axelrad, J., Halfvarson, J., Khalili, H., Larsson, E., Lochhead, P., Roelstraete, B., Simon, T.G., Söderling, J. and Olen, O.	Inflammatory bowel disease and risk of severe COVID-19: a nationwide population-based cohort study in Sweden	2021	Paediatric
Lukin, D.J., Kumar, A., Hajifathalian, K., Sharaiha, R.Z., Scherl, E.J., Longman, R.S., Funez-dePagnier, G., Duenas-Bianchi, L., Jacob, V., Battat, R.J. and Krisko, T.	Baseline disease activity and steroid therapy stratify risk of COVID-19 in patients with inflammatory bowel disease.	2020	Insufficient data
Macaluso, F. S. and Giuliano, A. and Fries, W. and Viola, A. and Abbruzzese, A. and Cappello, M. and Giuffrida, E. and Carrozza, L. and Privitera, A. C. and Magnano, A. and Ferracane, C. and Scalisi, G. and Minissale, M. G. and Giangreco, E. and Garufi, S. and Bertolami, C. and Cucinotta, U. and Graziano, F. and CasÃ , A. and Renna, S. and Teresi, G. and Rizzuto, G. and Mannino, M. and Maida, M. and Orl and o, A.	Severe Activity of Inflammatory Bowel Disease is a Risk Factor for Severe COVID-19	2023	2023
Mageau, A., Papo, T., Ruckly, S., Strukov, A., van Gysel, D., Sacre, K. and Timsit, J.F	Survival after COVID-19-associated organ failure among inpatients with systemic lupus erythematosus in France: a nationwide study	2022	Insufficient data
Mapahla, Lovemore and Abdelmaksoud, Asmaa and Arif, Rida and Islam, Nazmul and Chinhenzva, Albert and Doi, Suhail AR and Chivese, Taw and a	The risk of severe COVID-19 and mortality from COVID-19 in people living with HIV compared to individuals without HIV-a systematic review and meta-analysis of 1 268 676 individuals	2021	Systematic Review

Marinaki, Smaragdi and Tsiakas, Stathis and Korogiannou, Maria and Grigorakos, Konstantinos and Papalois, Vassilios and Boletis, Ioannis	A systematic review of COVID-19 infection in kidney transplant recipients: a universal effort to preserve patientsâ€™ lives and allografts	2020	Systematic Review
Martinez-Lopez, J. and Mateos, M. V. and Lopez-Munoz, N. and Magan, M. A. S. and De Miguel, M. D. and De la Guia, A. L. and Sureda, A. and Encinas, C. and Royo, D. C. and Rosinol, L. and Tomas, L. G. and Hern and ez-Rivas, J. A. and Rojas, J. A. and Alegre, A. and Blanchard, M. J. and Barrigon, F. E. and Garcia, E. G. and Inigo, B. and Barahona, P. B. and Penalver, F. J. and De La Rubia, J. and Fern and ez-Escalada, N. and Alonso, J. M. A. and Blade, J. and Lahuerta, J. J. and De La Cruz, J. and San-Miguel, J. F.	Severity of COVID-19 clinical outcomes and mortality in multiple myeloma patients over year 1 of the pandemic	2021	Insufficient data
Martínez-López, J., Mateos, M.V., Encinas, C., Sureda, A., Hernández-Rivas, J.Á., Lopez de la Guia, A., Conde, D., Krsnik, I., Prieto, E., Riaza Grau, R. and Gironella, M.	Multiple myeloma and SARS-CoV-2 infection: clinical characteristics and prognostic factors of inpatient mortality	2020	Single Centre
Masclioni, M.	COVID-19 rate no higher with HIV in largest US HIV+/HIV- cohort.	2020	Duplication
McKeigue, P.M., Porter, D., Hollick, R.J., Ralston, S.H., McAllister, D.A. and Colhoun, H.M.	Risk of severe COVID-19 in patients with inflammatory rheumatic diseases treated with immunosuppressive therapy in Scotland	2023	2023
Medina-Pestana, J., Cristelli, M.P., Foresto, R.D., Tedesco-Silva, H. and Requião-Moura, L.R	The higher COVID-19 fatality rate among kidney transplant recipients calls for further action	2022	Single Centre
Mellor, M. M. and Bast, A. C. and Jones, N. R. and Roberts, N. W. and OrdÃ³Ã±ez-Mena, J. M. and Reith, A. J. M. and Butler, C. C. and Matthews, P. C. and Dorward, J.	Risk of adverse coronavirus disease 2019 outcomes for people living with HIV	2021	Systematic Review
Meng, Y., Lu, W., Guo, E., Liu, J., Yang, B., Wu, P., Lin, S., Peng, T., Fu, Y., Li, F. and Wang, Z	Cancer history is an independent risk factor for mortality in hospitalized COVID-19 patients: a propensity scoreâ€matched analysi	2020	Single Centre
Modelli de Andrade, L. G. and de S and es-Freitas, T. V. and Requiao-Moura, L. R. and Viana, L. A. and Cristelli, M. P. and Garcia, V. D. and Alcantara, A. L. C. and Esmeraldo, R. M. and Abbud Filho, M. and Pacheco-Silva, A. and de Lima Carneiro, E. C. R. and Manfro, R. C. and Costa, Kmah and Simao, D. R. and de Sousa, M. V. and Santana, Vbbm and Noronha, I. L. and Romao, E. A. and Zanocco, J. A. and Arimatea, G. G. Q. and De Boni Monteiro de Carvalho, D. and Tedesco-Silva, H. and Medina-Pestana, J. and Brazil, Covid-Kt	Development and validation of a simple web-based tool for early prediction of COVID-19-associated death in kidney transplant recipients	2022	Insufficient data
Mollaeian, A., Kim, D.S. and Haas, C.J	COVID-19 Prevalence and Outcomes among Individuals with Rheumatoid Arthritis and Systemic Lupus ErythematosusÂ	2021	Insufficient data
Möller, I.K., Gisslén, M., Wagner, P., Sparén, P. and Carlander, C.	COVID-19 hospitalization outcomes in adults by HIV status; a nationâ€wide registerâ€based study	2023	2023
Molnar, M.Z., Bhalla, A., Azhar, A., Tsujita, M., Talwar, M., Balaraman, V., Sodhi, A., Kadaria, D., Eason, J.D., Hayek, S.S. and Coca, S.G	Outcomes of critically ill solid organ transplant patients with COVID-19 in the United States.	2020	Duplication
Moradi, Y. and Soheili, M. and Dehghanbanadaki, H. and Moradi, G. and Moradpour, F. and Mahdavi Mortazavi, S. M. and Gilzad Kohan, H. and Zareie, M.	The Effect of HIV/AIDS Infection on the Clinical Outcomes of COVID-19: A Meta-Analysis	2022	Systematic Review

Muthuka, J. K. and Francis, M. W. and Oluoch, K. J. and Nzioki, J. M.	Effect of HIV disease and the associated moderators on COVID-19 Mortality	2022	Systematic Review
Okumura, K. and Dh and , A. and Misawa, R. and Sogawa, H. and Bodin, R. and Wolf, D. C. and Nishida, S.	Impact of COVID-19 on Increased Mortality in Liver Transplant Recipients in United States	2022	Systematic Review
Overvad, M., Koch, A., Jespersen, B., Gustafsson, F., Krause, T.G., Hansen, C.H., Ethelberg, S. and Obel, N	Outcomes following SARS-CoV-2 infection in individuals with and without solid organ transplantation—A Danish nationwide cohort study	2022	Insufficient data
Oyelade, T. and Alqahtani, J. S. and Hjazi, A. M. and Li, A. and Kamila, A. and Raya, R. P.	Global and Regional Prevalence and Outcomes of COVID-19 in People Living with HIV: A Systematic Review and Meta-Analysis	2022	Insufficient data
Ozturk, S., Turgutalp, K., Arici, M., Odabas, A.R., Altiparmak, M.R., Aydin, Z., Cebeci, E., Basturk, T., Soypacaci, Z., Sahin, G. and Elif Ozler, T.	Mortality analysis of COVID-19 infection in chronic kidney disease, haemodialysis and renal transplant patients compared with patients without kidney disease: a nationwide analysis from Turkey.	2020	Duplication
Pahalyants, V. and Murphy, W. S. and Klebanov, N. and Theodosakis, N. and Klevens, R. M. and Lilly, E. and Asgari, M. and Semenov, Y. R.	28552 Risk of COVID-19 and subsequent mortality among patients receiving immunosuppressive biologic therapy: A retrospective matched cohort study	2021	Systematic Review
Peach, E., Rutter, M., Lanyon, P., Grainge, M.J., Hubbard, R., Aston, J., Bythell, M., Stevens, S. and Pearce, F.	Risk of death among people with rare autoimmune diseases compared with the general population in England during the 2020 COVID-19 pandemic	2021	All-cause mortality
Penso, L. and Dray-Spira, R. and Weill, A. and Zureik, M. and Sbidian, E.	Psoriasis-related treatment exposure and hospitalization or in-hospital mortality due to COVID-19 during the first and second wave of the pandemic: cohort study of 1 326 312 patients in France*	2022	All-cause mortality
RÃ¼thrich, Maria Madeleine and Giessen-Jung, C and Borgmann, S and Classen, AY and Dolff, S and GrÃ¼ner, B and Hanses, F and Isberner, N and KÃ¶hler, P and Lanznaster, J	COVID-19 in cancer patients: clinical characteristics and outcomeâ€”an analysis of the LEOSS registry	2021	Paediatric
Raiker, R., Pakhchanian, H., DeYoung, C., Gupta, L., Kardeş, S., Ahmed, S. and Kavadichanda, C.	Short term outcomes of COVID-19 in lupus: Propensity score matched analysis from a nationwide multi-centric research network	2021	All-cause mortality
Raiker, R., Pakhchanian, H., DeYoung, C., Gupta, L., Kardeş, S., Ahmed, S. and Kavadichanda, C.,	Short term outcomes of COVID-19 in lupus: propensity score matched analysis from a nationwide multi-centric research network.	2021	All-cause mortality
Raiker, R., Pakhchanian, H., Hussain, A. and Deng, M.	Outcomes of COVID-19 in patients with skin cancer	2021	All-cause mortality
Raja, Mohammed A and Mendoza, Maria A and Villavicencio, Aasith and Anjan, Shweta and Reynolds, John M and Kittipibul, Veraprapas and Fern and ez, Anmary and Guerra, Giselle and Camargo, Jose F and Simkins, Jacques	COVID-19 in solid organ transplant recipients: a systematic review and meta-analysis of current literature	2021	Systematic Review

Ravanan, R. and Callaghan, C. J. and Mumford, L. and Ushiro-Lumb, I. and Thorburn, D. and Casey, J. and Friend, P. and Parameshwar, J. and Currie, I. and Burnapp, L. and Baker, R. and Dudley, J. and Oniscu, G. C. and Berman, M. and Asher, J. and Harvey, D. and Manara, A. and Manas, D. and Gardiner, D. and Forsythe, J. L. R.	SARS-CoV-2 infection and early mortality of waitlisted and solid organ transplant recipients in England: A national cohort study	2020	Insufficient data
Regalado-Artamendi, I. and Jimenez-Ubieto, A. and Hern and ez-Rivas, J. A. and Navarro, B. and Nunez, L. and Alaez, C. and Cordoba, R. and Penalver, F. J. and Cannata, J. and Estival, P. and Quiroz-Cervantes, K. and Riaza Grau, R. and Velasco, A. and Martos, R. and Domingo-Gonzalez, A. and Benito-Parra, L. and Gomez-Sanz, E. and Lopez-Jimenez, J. and Matilla, A. and Herraez, M. R. and Penalva, M. J. and Garcia-Suarez, J. and Diez-Martin, J. L. and Bastos-Oreiro, M.	Risk Factors and Mortality of COVID-19 in Patients With Lymphoma: A Multicenter Study	2021	Insufficient data
Requiao-Moura, L. R. and Modelli de Andrade, L. G. and de S and es-Freitas, T. V. and Cristelli, M. P. and Viana, L. A. and Nakamura, M. R. and Garcia, V. D. and Manfro, R. C. and Simao, D. R. and Almeida, Ramb and Ferreira, G. F. and Costa, Kmah and de Lima, P. R. and Pacheco-Silva, A. and Charpiot, Immf and Deboni, L. M. and Ferreira, T. C. A. and Mazzali, M. and Calazans, C. A. C. and Oria, R. B. and Tedesco-Silva, H. and Medina-Pestana, J. and Group*, Covid-Kt Brazil Study	The Mycophenolate-based Immunosuppressive Regimen Is Associated With Increased Mortality in Kidney Transplant Patients With COVID-19	2022	Insufficient data
Rocha, S. Q. and Avelino-Silva, V. I. and Tancredi, M. V. and Jamal, L. F. and Ferreira, P. R. A. and Tayra, A. and Ferreira, P. M. and Carvalhanas, T. and Domingues, C. S. B. and Souza, R. A. and Gianna, M. C. and Kalichman, A. O. and Leite, O. H. M. and Souza, T. N. L. and Gomes, E. Costa D. A. and Furtado, J. J. D. and Costa, A. F.	COVID-19 and HIV/AIDS in a cohort study in Sao Paulo, Brazil: outcomes and disparities by race and schooling	2022	Insufficient data
Russell, Beth and Moss, Charlotte L and Shah, Vallari and Ko, Thinzar Ko and Palmer, Kieran and Sylva, Rushan and George, Gincy and Monroy-Iglesias, Maria J and Patten, Piers and Ceesay, Muhammed Mansour	Risk of COVID-19 death in cancer patients: an analysis from Guyâ€™s Cancer Centre and Kingâ€™s College Hospital in London	2021	Insufficient data
Rutter, M., Lanyon, P.C., Grainge, M.J., Hubbard, R., Bythell, M., Stilwell, P., Aston, J., McPhail, S., Stevens, S. and Pearce, F.A.	COVID-19 infection, admission and death and the impact of corticosteroids amongst people with rare autoimmune rheumatic disease during the second wave	2023	2023
SÃ¸ftel and , John M and Friman, Gustav and von Zurâ€MÃ¼hlen, Bengt and Ericzon, Boâ€GÃ¶ran and Wallquist, Carin and Karason, Kristjan and Friman, V and a and Ekelund, Jan and Felldin, Marie and Magnusson, Jesper	COVID-19 in solid organ transplant recipients: a national cohort study from Sweden	2021	Insufficient data
Sachdev, D., Mara, E., Hsu, L., Scheer, S., Rutherford, G., Enanoria, W. and Gandhi, M.	COVID-19 susceptibility and outcomes among people living with HIV in San Francisco	2021	Insufficient data
Sahota, A., Tien, A., Yao, J., Dong, E., Herald, J., Javaherifar, S., Neyer, J., Hwang, J., Lee, R. and Fong, T.L.	Incidence, risk factors, and outcomes of COVID-19 infection in a large cohort of solid organ transplant recipients	2022	Duplication
Saini, Kamal S and Tagliamento, Marco and Lambertini, Matteo and McNally, Richard and Romano, Marco and Leone, Manuela and Curigliano, Giuseppe and de Azambuja, Ev and ro	Mortality in patients with cancer and coronavirus disease 2019: a systematic review and pooled analysis of 52 studies	2020	Systematic Review
Sales, T.L.S., Souza-Silva, M.V.R., Delfino-Pereira, P., Neves, J.V.B., Sacioto, M.F., de Assis, V.C.M., Duani, H., de Oliveira, N.R., Sampaio, N.D.C.S., Ramos, L.E.F. and Schwarzbold, A.V	COVID-19 outcomes in people living with HIV: peering through the waves	2023	2023
Salto-Alej and re, Sonsoles and Jimenez-Jorge, Silvia and SabÃ©, Nuria and Ramos-MartÃnez, Antonio and Linares, Laura and Valerio, Maricela and	Risk factors for unfavorable outcome and impact of early post-transplant	2021	Insufficient data

Martin-Davila, Pilar and FernÃ¡ndez-Ruiz, Mario and FariÃ±as, MarÃa Carmen and Blanes-Julia, Marino	infection in solid organ recipients with COVID-19: A prospective multicenter cohort study		
Sánchez-Velázquez A, Bauer-Alonso A, Estrach T, Vega-Díez D, Garcia-Muret P, Haya L, Peñate Y, Acebo E, Fernández de Misa R, Blanes M, Suh-Oh HJ	Â Patients with primary cutaneous lymphoma are at risk for severe COVID-19. Data from the Spanish primary cutaneous lymphoma registry.	2021	Insufficient data
Schaffrath, J. and Brummer, C. and Wolff, D. and Holtick, U. and Kroger, N. and Bornhauser, M. and Kraus, S. and Hilgendorf, I. and Blau, I. W. and Penack, O. and Wittke, C. and Steiner, N. and Nachbaur, D. and Thurner, L. and Hindahl, H. and Zeiser, R. and Maier, C. P. and Bethge, W. and Muller, L. P.	High Mortality of COVID-19 Early after Allogeneic Stem Cell Transplantation: A Retrospective Multicenter Analysis on Behalf of the German Cooperative Transplant Study Group	2022	Insufficient data
Serraino, D., Zucchetto, A., Dal Maso, L., Del Zotto, S., Taboga, F., Clagnan, E., Fratino, L., Tosolini, F. and Burba, I.	Prevalence , determinants, and outcomes of SARS-COV-2 infection among cancer patients. A population-based study in northern Italy	2021	All-cause mortality
Shapiro, A. E. and Bender Ignacio, R. A. and Whitney, B. M. and Delaney, J. A. and Nance, R. M. and Bamford, L. and Wooten, D. and Keruly, J. C. and Burkholder, G. and Napravnik, S. and Mayer, K. H. and Webel, A. R. and Kim, H. N. and Van Rompaey, S. E. and Christopoulos, K. and Jacobson, J. and Karris, M. and Smith, D. and Johnson, M. O. and Willig, A. and Eron, J. J. and Hunt, P. and Moore, R. D. and Saag, M. S. and Mathews, W. C. and Crane, H. M. and Cachay, E. R. and Kitahata, M. M.	Factors Associated With Severity of COVID-19 Disease in a Multicenter Cohort of People With HIV in the United States, March-December 2020	2022	Insufficient data
Sharafeldin, Noha and Bates, Benjamin and Song, Qianqian and Madhira, Vithal and Yan, Yao and Dong, Sharlene and Lee, Eileen and Kuhrt, Nathaniel and Shao, Yu Raymond and Liu, Feifan	Outcomes of COVID-19 in patients with cancer: report from the National COVID Cohort Collaborative (N3C)	2021	Insufficient data
Shaw, B. and Shortt, J. and Low, M. and Rogers, B. and Kaplan, Z. and Fedele, P. and Gregory, G. and Vilcassim, S. and Gilbertson, M. and Grigoriadis, G. and Opat, S.	Low mortality in vaccinated immunocompromised haematology patients infected with SARS-CoV-2	2022	Insufficient data
Shields, A. M. and Tadros, S. and Al-Hakim, A. and Nell, J. M. and Lin, M. M. N. and Chan, M. and Goddard, S. and Dempster, J. and Dziadzio, M. and Patel, S. Y. and Elkalifa, S. and Huissoon, A. and Duncan, C. J. A. and Herwadkar, A. and Khan, S. and Bethune, C. and Elcombe, S. and Thaventhiran, J. and Klenerman, P. and Lowe, D. M. and Savic, S. and Burns, S. O. and Richter, A. G.	Impact of vaccination on hospitalization and mortality from COVID-19 in patients with primary and secondary immunodeficiency: The United Kingdom experience	2022	Insufficient data
Singh, A. K. and Jena, A. and Kumar, M. P. and Sharma, V. and Sebastian, S.	Risk and outcomes of coronavirus disease in patients with inflammatory bowel disease: A systematic review and meta-analysis	2021	Systematic Review
Singh, S., Khan, A., Chowdhry, M., Bilal, M., Kochhar, G.S. and Clarke, K.	Â Risk of severe coronavirus disease 2019 in patients with inflammatory bowel disease in the United States: a Multicenter Research Network Study.Â	2020	Compound outcome
Sonaglia, A., Comoretto, R., Pasut, E., Treppo, E., Del Frate, G., Colatutto, D., Zabotti, A., De Vita, S. and Quartuccio, L.	Safety of Biologic-DMARDs in Rheumatic Musculoskeletal Disorders: A Population-Based Study over the First Two Waves of COVID-19 Outbreak	2022	Insufficient data
Sparks, J. A. and Wallace, Z. S. and Seet, A. M. and Gianfrancesco, M. A. and Izadi, Z. and Hyrich, K. L. and Strangfeld, A. and Gossec, L. and Carmona, L. and Mateus, E. F. and Lawson-Tovey, S. and Trupin, L. and Rush, S. and Katz, P. and Schmajuk, G. and Jacobsohn, L. and Wise, L. and Gilbert, E. L. and Duarte-GarcÃa, A. and Valenzuela-Almada, M. O.	Associations of baseline use of biologic or targeted synthetic DMARDs with COVID-19 severity in rheumatoid arthritis: Results from the COVID-19	2021	Insufficient data

and Pons-Estel, G. J. and Isnardi, C. A. and Berbotto, G. A. and Hsu, T. Y. and D'Silva, K. M. and Patel, N. J. and Kearsley-Fleet, L. and SchÃ¤fer, M. and Ribeiro, S. L. E. and Al Emadi, S. and Tidblad, L. and ScirÃ¨, C. A. and Raffeiner, B. and Thomas, T. and Flipo, R. M. and Avouac, J. and Seror, R. and Bernardes, M. and Cunha, M. M. and Hasseli, R. and Schulze-Koops, H. and MÃ¼ller-Ladner, U. and Specker, C. and Souza, V. A. and Mota, Lmhd and Gomides, A. P. M. and DieudÃ©, P. and Nikiphorou, E. and Kronzer, V. L. and Singh, N. and Ugarte-Gil, M. F. and Wallace, B. and Akpabio, A. and Thomas, R. and Bhana, S. and Costello, W. and Grainger, R. and Hausmann, J. S. and Liew, J. W. and Sirotich, E. and Sufka, P. and Robinson, P. C. and Machado, P. M. and Yazdany, J.	Global Rheumatology Alliance physician registry		
Spila Alegiani, S., Crisafulli, S., Giorgi Rossi, P., Mancuso, P., Salvarani, C., Atzeni, F., Gini, R., Kirchmayer, U., Belleudi, V., Kurotschka, P.K. and Leoni, O	Risk of coronavirus disease 2019 hospitalization and mortality in rheumatic patients treated with hydroxychloroquine or other conventional disease-modifyingÂ	2021	Insufficient data
Ssentongo, P. and Heilbrunn, E. S. and Ssentongo, A. E. and Advani, S. and Chinchilli, V. M. and Nunez, J. J. and Du, P.	Epidemiology and outcomes of COVID-19 in HIV-infected individuals: a systematic review and meta-analysis	2021	Systematic Review
Ssentongo, P. and Ssentongo, A. E. and Heilbrunn, E. S. and Du, P.	Prevalence of HIV in patients hospitalized for COVID-19 and associated mortality outcomes: A systematic review and meta-analysis	2020	Systematic Review
Steffanoni, S. and Calimeri, T. and Laurenge, A. and Fox, C. P. and Soussain, C. and Grommes, C. and Tisi, M. C. and Boot, J. and Crosbie, N. and Visco, C. and Arcaini, L. and Chaganti, S. and Sassone, M. C. and Alencar, A. and Armiento, D. and Romano, I. and Dietrich, J. and Itchaki, G. and Bruna, R. and Fracchiolla, N. S. and Arletti, L. and Venditti, A. and Booth, S. and Musto, P. and Hoang Xuan, K. and Batchelor, T. T. and Cwynarski, K. and Ferreri, A. J. M.	Impact of severe acute respiratory syndrome coronavirus-2 infection on the outcome of primary central nervous system lymphoma treatment: A study of the International PCNSL Collaborative Group	2022	Systematic Review
Sultan, K. and Durbin, L. and Bhardwaj, R. and Mackey, J. and Becher, N. and Abureesh, M. and Lakhani, K. and Mone, A. and Abergel, J. and Trindade, A. and Korelitz, B. I. and Swaminath, A.	Corticosteroid and Biologic Use Not Associated With Adverse Outcomes for Inflammatory Bowel Disease Patients Hospitalized With COVID-19	2021	Insufficient data
Sun, J., Patel, R., Madhira, V., Olex, A.L., French, E., Islam, J.Y., Moffitt, R., Franceschini, N., Mannon, R.B. and Kirk, G.D	COVID-19 HOSPITALIZATION AMONG PEOPLE WITH HIV OR SOLID ORGAN TRANSPLANT IN THE US.	2021	Duplication
Sun, Y., Miller, D.C., Akpandak, I., Chen, E.M., Arnold, B.F. and Acharya, N.R	Association between immunosuppressive drugs and coronavirus disease 2019 outcomes in patients with noninfectious uveitis in a large US claims database	2022	Insufficient data
Swan, J. T. and Rizk, E. and Jones, S. L. and Nwana, N. and Nicolas, J. C. and Tran, A. and Nisar, T. and Menser, T. and Yi, S. G. and Moore, L. W. and Gaber, A. O. and Knight, R. J.	Propensity matched analysis of death and non-favorable discharge among hospitalized transplant recipients with covid-19	2021	Insufficient data
Taxonera, C., Sagastagoitia, I., Alba, C., Manas, N., Olivares, D. and Rey, E	2019 novel coronavirus disease [COVID-19] in patients with inflammatory bowel diseases.	2020	Insufficient data
Tesoriero, J.M., Swain, C.A.E., Pierce, J.L., Zamboni, L., Wu, M., Holtgrave, D.R., Gonzalez, C.J., Udo, T., Morne, J.E., Hart-Malloy, R. and Rajulu, D.T.	COVID-19 outcomes among persons living with or without diagnosed HIV infection in New York state	2021	Duplication

Tilch, M. K. and Visco, C. and Kinda, S. and Hermine, O. and Kohn, M. and Besson, C. and Lamure, S. and DulÃ©ry, R. and Ragaini, S. and Eyre, T. A. and Van Meerten, T. and Ohler, A. and Eckerle, S. and Dreyling, M. and Hess, G. and GinÃ©, E. and Gomes da Silva, M.	Outcome of COVID-19 in Patients With Mantle Cell Lymphoma-Report From the European MCL Registry	2022	Insufficient data
Trapani, S., Masiero, L., Puoti, F., Rota, M.C., Del Manso, M., Lombardini, L., Riccardo, F., Amoroso, A., Pezzotti, P., Grossi, P.A. and Brusaferro, S	Incidence and outcome of SARS-CoV-2 infection on solid organ transplantation recipients: a nationwide population-based study	2021	Paediatric
Tripathi, K. and Godoy Brewer, G. and Thu Nguyen, M. and Singh, Y. and Saleh Ismail, M. and Sauk, J. S. and Parian, A. M. and Limketkai, B. N.	COVID-19 and Outcomes in Patients With Inflammatory Bowel Disease: Systematic Review and Meta-Analysis	2022	Systematic Review
Turk, M. and Alhuneafat, L. and Rizvi, A. W. and Gupta, N. and Barnett, K. and Gutta, R. and Mealy, S. and Rana, T. and Shah, A. and Sharma, A. and Osman, O. and Sureshkumar, K. K.	COVID-19 Mortality in Kidney Transplant Recipients: Analysis of Risk Factors	2022	Insufficient data
Ugarte-Gil, M. F. and AlarcÃ³n, G. S. and Izadi, Z. and Duarte-GarcÃa, A. and ReÃ¡tegui-Sokolova, C. and Clarke, A. E. and Wise, L. and Pons-Estel, G. J. and Santos, M. J. and Bernatsky, S. and Ribeiro, S. L. E. and Al Emadi, S. and Sparks, J. A. and Hsu, T. Y. and Patel, N. J. and Gilbert, E. L. and Valenzuela-Almada, M. O. and JÃ¶nsen, A. and L and olfi, G. and Fredi, M. and Goulenok, T. and Devaux, M. and Mariette, X. and Queyrel, V. and RomÃ£o, V. C. and Sequeira, G. and Hasseli, R. and Hoyer, B. and Voll, R. E. and Specker, C. and Baez, R. and Castro-Coello, V. and Maldonado Ficco, H. and Reis Neto, E. T. and Ferreira, G. A. A. and Monticielo, O. A. A. and Sirotich, E. and Liew, J. and Hausmann, J. and Sufka, P. and Grainger, R. and Bhana, S. and Costello, W. and Wallace, Z. S. and Jacobsohn, L. and Taylor, T. and Ja, C. and Strangfeld, A. and Mateus, E. F. and Hyrich, K. L. and Carmona, L. and Lawson-Tovey, S. and Kearsley-Fleet, L. and SchÃ¤fer, M. and Machado, P. M. and Robinson, P. C. and Gianfrancesco, M. and Yazdany, J.	Characteristics associated with poor COVID-19 outcomes in individuals with systemic lupus erythematosus: data from the COVID-19 Global Rheumatology Alliance	2022	Insufficient data
Ugarte-Gil, M. F. and AlarcÃ³n, G. S. and Seet, A. M. and Izadi, Z. and Montgomery, A. D. and Duarte-GarcÃa, A. and Gilbert, E. L. and Valenzuela-Almada, M. O. and Wise, L. and Sparks, J. A. and Hsu, T. Y. and D'Silva, K. M. and Patel, N. J. and Sirotich, E. and Liew, J. W. and Hausmann, J. S. and Sufka, P. and Grainger, R. and Bhana, S. and Wallace, Z. and Jacobsohn, L. and Strangfeld, A. and Mateus, E. F. and Hyrich, K. L. and Gossec, L. and Carmona, L. and Lawson-Tovey, S. and Kearsley-Fleet, L. and Schaefer, M. and Machado, P. M. and Robinson, P. C. and Gianfrancesco, M. and Yazdany, J.	Association Between Race/Ethnicity and COVID-19 Outcomes in Systemic Lupus Erythematosus Patients From the United States: Data From the COVID-19 Global Rheumatology Alliance	2023	2023
Varnai, C. and Palles, C. and Arnold, R. and Curley, H. M. and Purshouse, K. and Cheng, V. W. T. and Booth, S. and Campton, N. A. and Collins, G. P. and Hughes, D. J. and Kulasekararaj, A. G. and Lee, A. J. X. and Olsson-Brown, A. C. and Sharma-Oates, A. and Van Hemelrijck, M. and Lee, L. Y. W. and Kerr, R. and Middleton, G. and Cazier, J. B.	Mortality among Adults with Cancer Undergoing Chemotherapy or Immunotherapy and Infected with COVID-19	2022	Insufficient data
Vart, P. and Jager, K. J. and Arnol, M. and Duivenvoorden, R. and Franssen, C. F. M. and Groeneveld, M. and Hemmelder, M. H. and Lepeytre, F. and Malfait, T. and Midtvedt, K. and Mitra, S. and Facundo, C. and Noordzij, M. and Reina, C. C. and Safak, S. and Toapanta, N. and Hilbr and s, L. B. and Gansevoort, R. T.	A Comparative Study of Patient Mortality during First and Second Waves of Covid-19 Pandemic in Dialysis Patients and Kidney Transplant Recipients	2022	Insufficient data
Venturas, J., Zamparini, J., Shaddock, E., Stacey, S., Murray, L., Richards, G.A., Kalla, I., Mahomed, A., Mohamed, F., Mer, M. and Maposa, I.	Comparison of outcomes in HIV-positive and HIV-negative patients with COVID-19	2021	Single Centre
Vieira, M. and Comarmond, C. and Labreuche, J. and Mirouse, A. and Saadoun, D. and Richez, C. and	COVID-19 outcomes in giant cell arteritis and polymyalgia rheumatica	2022	Insufficient data

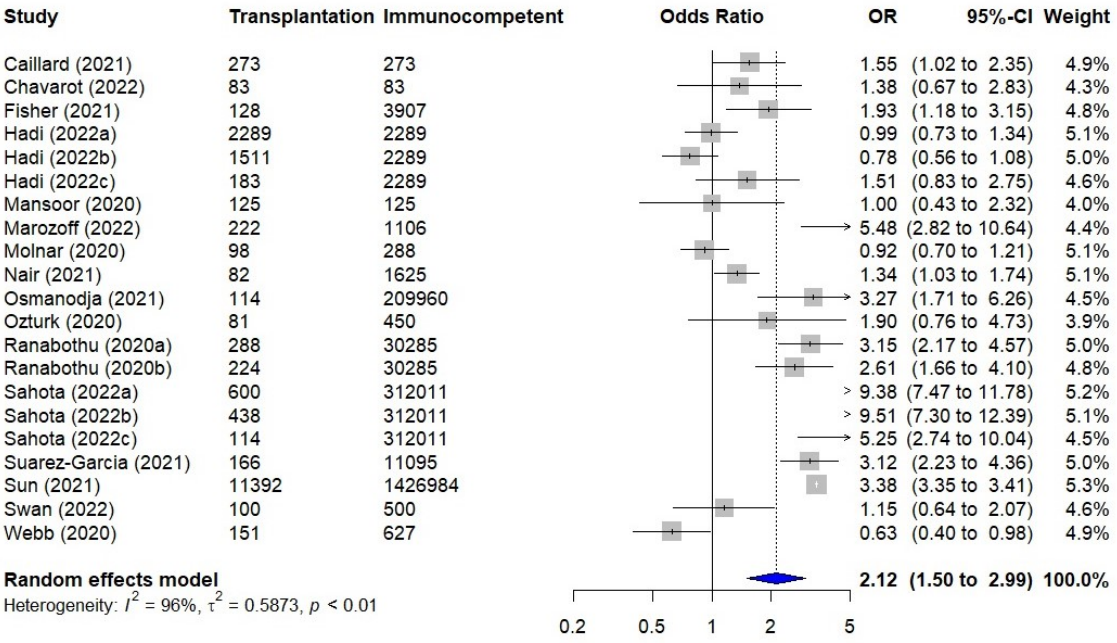
Flipo, R. M. and Hachulla, E. and Drumez, E. and Cacoub, P.	versus rheumatoid arthritis: A national, multicenter, cohort study		
Vijenthira, Abi and Gong, Inna Y and Fox, Thomas A and Booth, Stephen and Cook, Gordon and Fattizzo, Bruno and MartÃn-Moro, Fern and o and Razanamahery, Jerome and Riches, John C and Zwicker, Jeff	Outcomes of patients with hematologic malignancies and COVID-19: a systematic review and meta-analysis of 3377 patients	2020	Systematic Review
Visco, C. and Marcheselli, L. and Mina, R. and Sassone, M. and Guidetti, A. and Penna, D. and Cattaneo, C. and Bonuomo, V. and Busca, A. and Ferreri, A. J. M. and Bruna, R. and Petrucci, L. and Cairoli, R. and Salvini, M. and BertÃ¹, L. and Ladetto, M. and Pilerci, S. and Pinto, A. and Ramadan, S. and Marchesi, F. and Cavo, M. and Arcaini, L. and Coviello, E. and Romano, A. and Musto, P. and Massaia, M. and Fracchiolla, N. and Marchetti, M. and Scattolin, A. and Tisi, M. C. and Cuneo, A. and Della Porta, M. and Trentin, L. and Turrini, M. and Gherlinzoni, F. and Tafuri, A. and Galimberti, S. and Bocchia, M. and Cardinali, V. and Cilloni, D. and Corso, A. and Armiento, D. and Rigacci, L. and La Barbera, E. O. and Gambacorti-Passerini, C. and Visani, G. and Vallisa, D. and Venditti, A. and Selleri, C. and Conconi, A. and Tosi, P. and Lanza, F. and C and oni, A. and Krampera, M. and Corradini, P. and Passamonti, F. and Merli, F.	A prognostic model for patients with lymphoma and COVID-19: aÂ multicentre cohort study	2022	Insufficient data
Wagner, Michael J and Hennessy, Cass and ra and Beeghly, Alicia and French, Benjamin and Shah, Dimpy P and Croessmann, Sarah and Vilar-Compte, Diana and Ruiz-Garcia, Erika and Ingham, Matthew and Schwartz, Gary K	Demographics, Outcomes, and Risk Factors for Patients with Sarcoma and COVID-19: A CCC19-Registry Based Retrospective Cohort Study	2022	Insufficient data
Waleed, M. and Arshad, M. A. and Abdallah, M. and Younossi, Z. M. and Singal, A. K.	Disease severity and time since transplantation determine patient mortality among liver transplant recipients with COVID-19 infection: A meta-analysis	2020	Systematic Review
Wang, B. and Huang, Y.	Immunotherapy or other anti-cancer treatments and risk of exacerbation and mortality in cancer patients with COVID-19: a systematic review and meta-analysis	2020	Systematic Review
Wang, Q., Berger, N.A. and Xu, R.	Â When hematologic malignancies meet COVID-19 in the United States: infections, death and disparities.	2021	Insufficient data
Wang, Y. and Feng, R. and Xu, J. and Shi, L. and Feng, H. and Yang, H.	An updated meta-analysis on the association between HIV infection and COVID-19 mortality	2021	Systematic Review
Wang, Y. and Xie, Y. and Hu, S. and Ai, W. and Tao, Y. and Tang, H. and Jing, F. and Tang, W.	Systematic Review and Meta-Analyses of The Interaction Between HIV Infection And COVID-19: Two Years' Evidence Summary	2022	Systematic Review
Weissman, S. and Aziz, M. and Smith, W. L. and Elias, S. and Swaminath, A. and Feuerstein, J. D.	Safety of biologics in inflammatory bowel disease patients with COVID-19	2021	Systematic Review
Yang, H., Xu, J., Liang, X., Shi, L. and Wang, Y	Autoimmune diseases are independently associated with COVID-19 severity: Evidence based on adjusted effect estimates	2021	Systematic Review
Yendewa, G.A., Perez, J.A., Schlick, K., Tribout, H. and McComsey, G.A.	Clinical features and outcomes of COVID-19 among people living with HIV in the United States: A	2021	Duplication

	multicenter study from a large global health research networkÂ â€¦		
Yendewa, G.A., Perez, J.A., Schlick, K., Tribout, H. and McComsey, G.A.	Clinical Features and Outcomes of Coronavirus Disease 2019 Among People With Human Immunodeficiency Virus in the United States: A Multicenter Study From a Large Global Health Research Network (TriNetX).	2021	Duplication
Yilmaz, C. and Demir, I	Mortality Rate and Related Factors in Patients with Active Oncological Malignancies Hospitalized for Covid-19.	2022	Single Centre
Yue, X., Ye, Y., Choi, Y.C., Zhang, D. and Krueger, W.S.	Risk of severe COVID-19 outcomes among patients with immune-mediated inflammatory diseases or malignancies: a retrospective analysis of real-world dataÂ â€¦	2022	Paediatric
Yunihastuti, E. and Karjadi, T. H. and Widhani, A. and Mahdi, H. I. S. and Sundari, S. and Hapsari, A. F. and Koesnoe, S. and Djauzi, S.	Incidence and severity prediction score of COVID-19 in people living with HIV (SCOVHIV): experience from the first and second waves of the pandemic in Indonesia	2022	Insufficient data
Zabana, Y. and MarÃn-JimÃ©nez, I. and RodrÃguez-Lago, I. and Vera, I. and MartÃn-Arranz, M. D. and Guerra, I. and Gisbert, J. P. and Mesonero, F. and BenÃtez, O. and Taxonera, C. and Ponferrada-DÃaz, Ã and Piqueras, M. and Lucendo, A. J. and Caballol, B. and MaÃ±osa, M. and MartÃnez-Montiel, P. and Bosca-Watts, M. and Gordillo, J. and Buj and a, L. and MonceÃ±ido, N. and MartÃnez-PÃ©rez, T. and LÃ³pez, A. and RodrÃguez-GutiÃ©rrez, C. and GarcÃa-LÃ³pez, S. and Vega, P. and Rivero, M. and Melcarne, L. and Calvo, M. and Iborra, M. and Barreiro de-Acosta, M. and Sicilia, B. and Barrio, J. and PÃ©rez, J. L. and Busquets, D. and PÃ©rez-MartÃnez, I. and Navarro-Llavat, M. and HernÃ¡ndez, V. and ArgÃ¼elles-Arias, F. and RamÃ-rez Esteso, F. and Meijide, S. and Ramos, L. and GomollÃ³n, F. and MuÃ±oz, F. and Suris, G. and de Zarate, J. O. and Huguet, J. M. and LlaÃ³, J. and GarcÃa-Sepulcre, M. F. and Sierra, M. and DurÃ , M. and Estrecha, S. and Fuentes Coronel, A. and Hinojosa, E. and Olivan, L. and Iglesias, E. and GutiÃ©rrez, A. and Varela, P. and Rull, N. and Gilabert, P. and HernÃ¡ndez-Camba, A. and Brotons, A. and Ginard, D. and SesÃ©, E. and Carpio, D. and Aceituno, M. and Cabriada, J. L. and GonzÃ¡lez-Lama, Y. and JimÃ©nez, L. and Chaparro, M. and LÃ³pez-San RomÃ¡n, A. and Alba, C. and Plaza-Santos, R. and Mena, R. and Tamarit-SebastiÃ¡n, S. and Ricart, E. and Calafat, M. and Olivares, S. and Navarro, P. and Bertoletti, F. and Alonso-GalÃ¡n, H. and Pajares, R. and Olcina, P. and Manzano, P. and DomÃ¨nech, E. and Esteve, M. and On Behalf Of The Eneida Registry Of, Geteccu	Nationwide COVID-19-EII Study: Incidence, Environmental Risk Factors and Long-Term Follow-Up of Patients with Inflammatory Bowel Disease and COVID-19 of the ENEIDA Registry	2022	Insufficient data
Zanetti, A., Carrara, G., Landolfi, G., Rozza, D., Chighizola, C.B., Alunno, A., Andreoli, L., Caporali, R., Gerli, R., Sebastiani, G.D. and Valesini, G.	Increased COVID-19 mortality in patients with rheumatic diseases: results from the CONTROL-19 study by the Italian Society for Rheumatology	2022	Duplication
Zhang, M. and Bai, X. and Cao, W. and Ji, J. and Wang, L. and Yang, Y. and Yang, H.		2021	Systematic Review

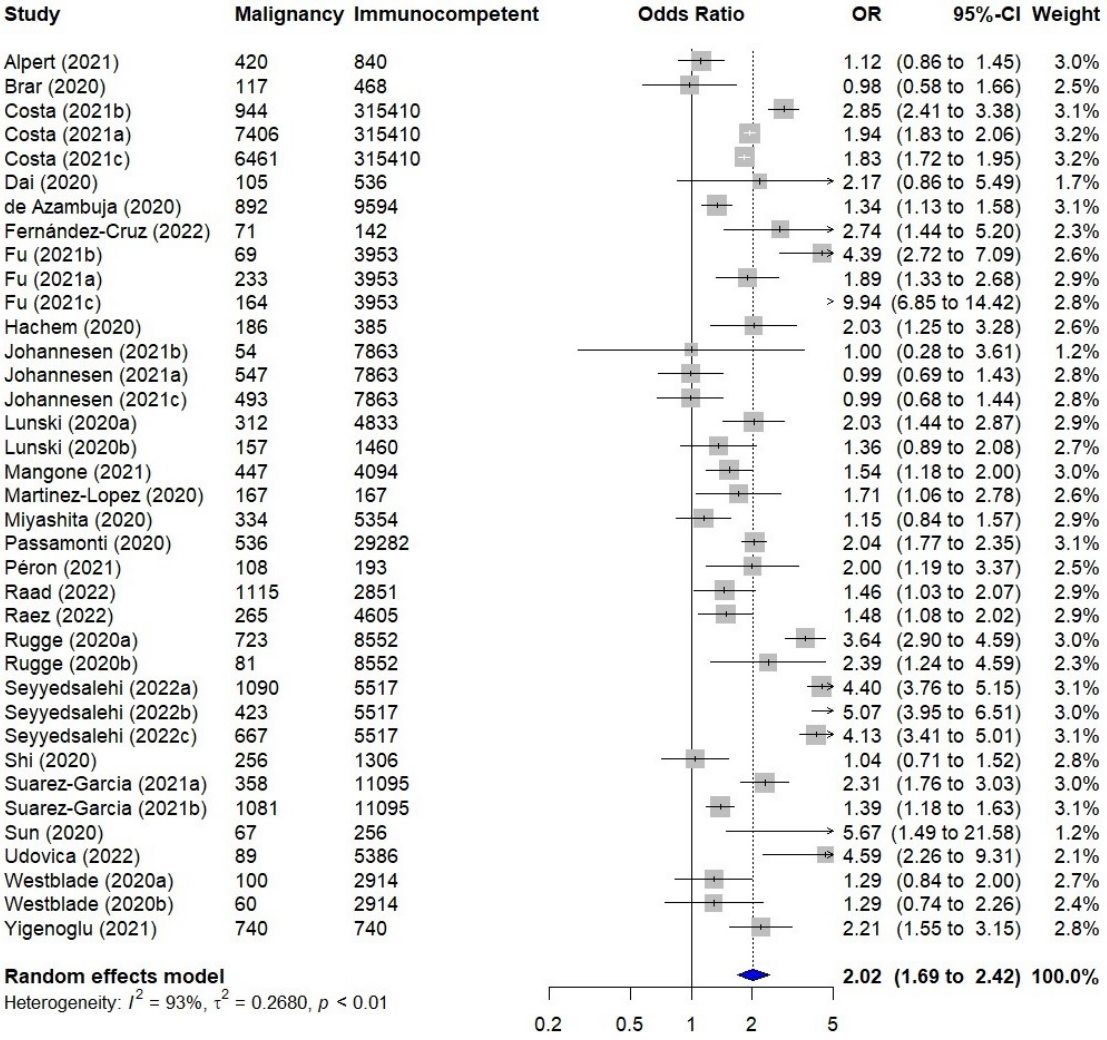
Appendix 9: Forest plots of all meta-analyses conducted

A. Excess COVID-19 associated mortality between immunosuppressed categories

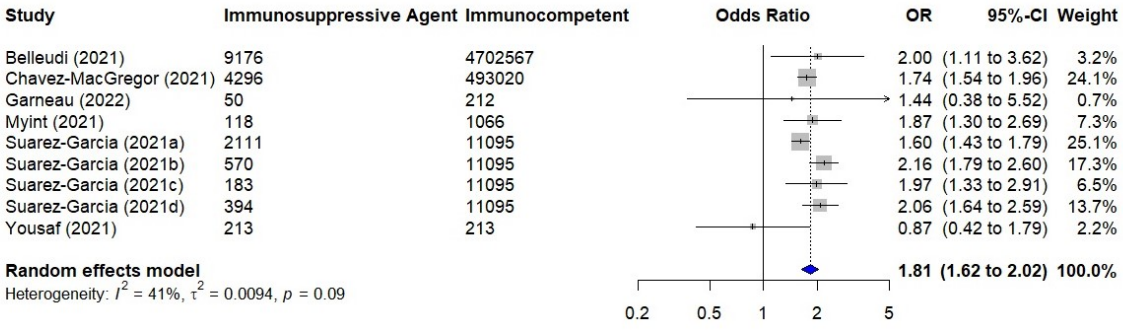
i. Forest Plot of excess COVID-19 associated mortality amongst transplant recipients



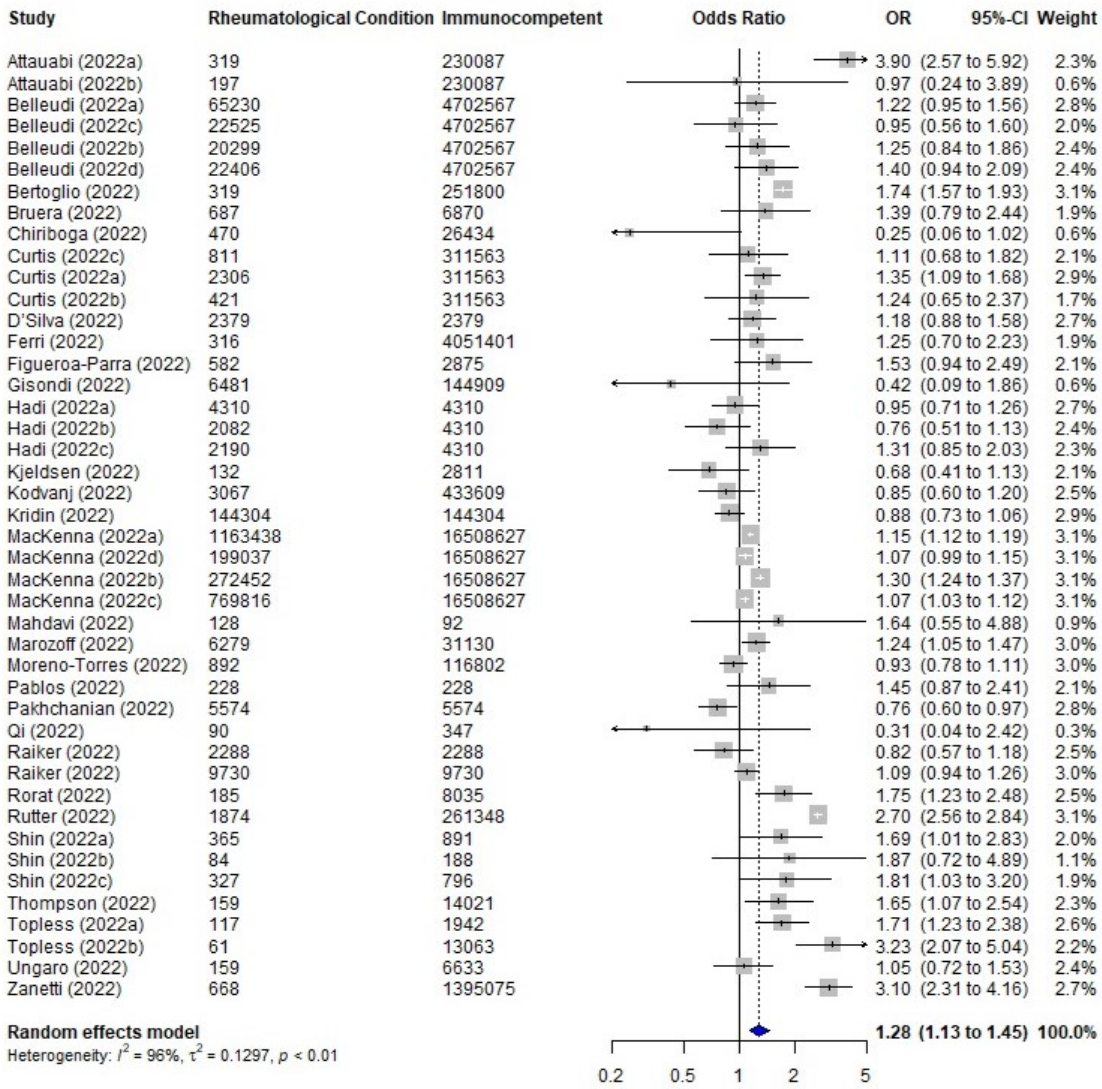
ii. Forest Plot of excess COVID-19 associated mortality amongst patients with malignancies as compared to immunocompetent controls



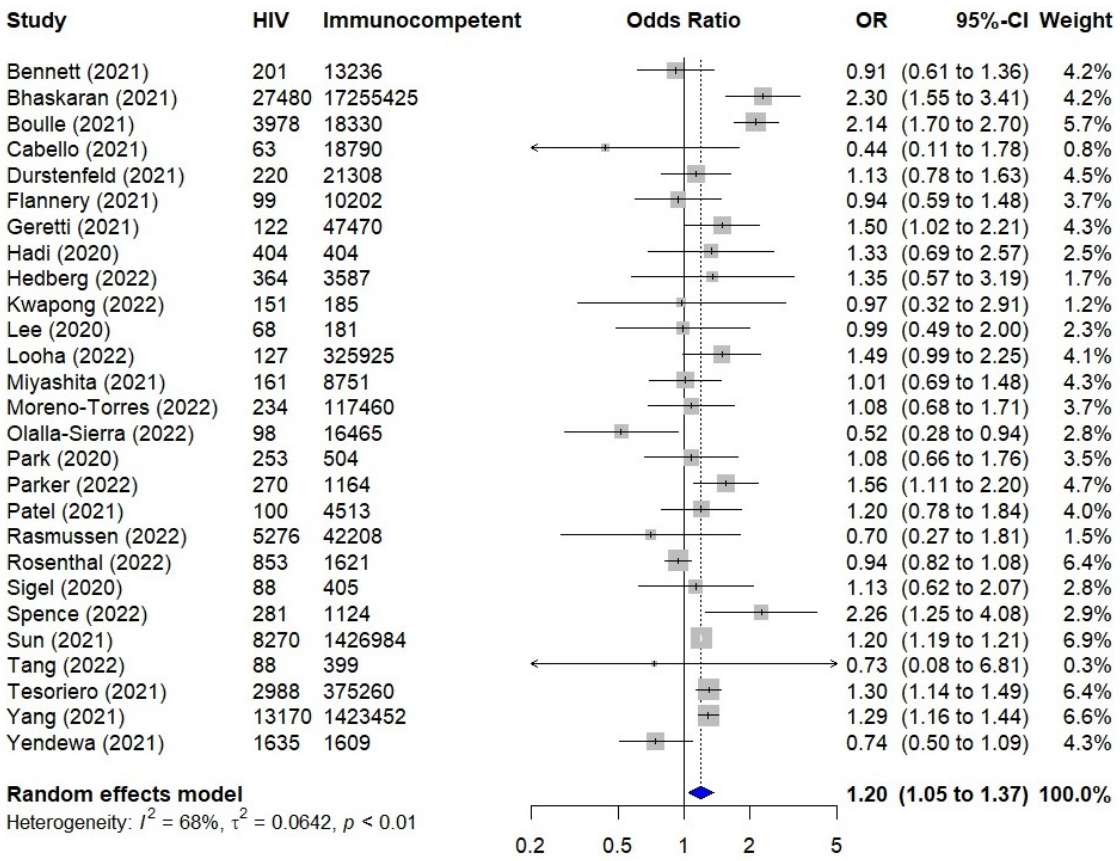
iii. Forest Plot of excess COVID-19 associated mortality amongst recipients of immunosuppressive agents as compared to immunocompetent controls



iv. Forest Plot of excess COVID-19 associated mortality amongst rheumatology patients as compared to immunocompetent controls

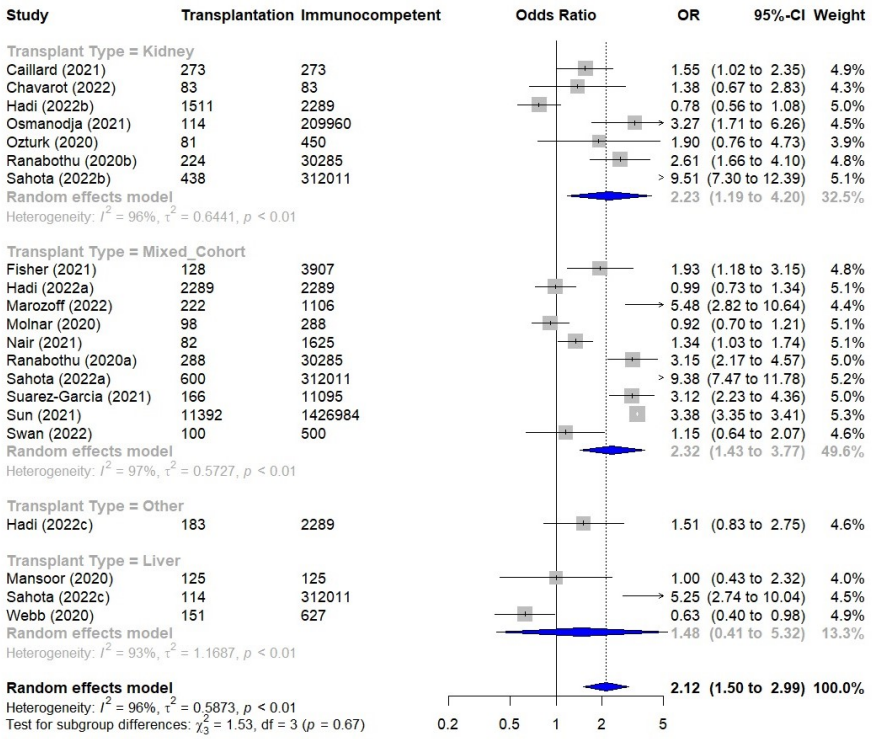


v. Forest Plot of excess COVID-19 associated mortality amongst HIV patients as compared to immunocompetent controls

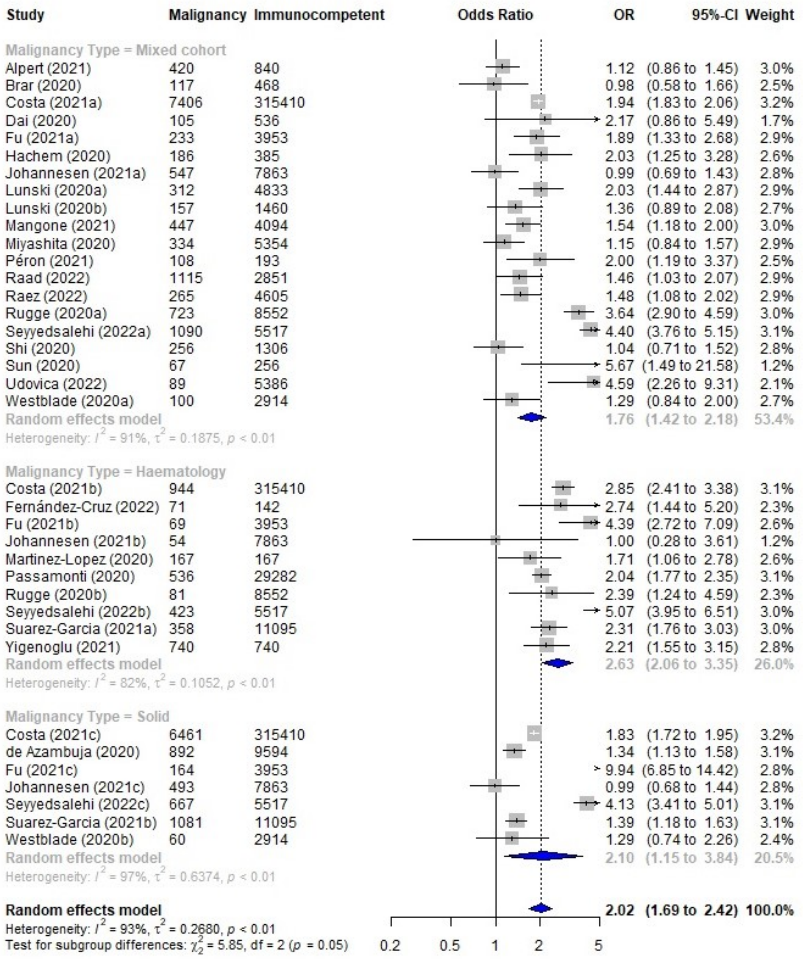


B. Excess COVID-19 associated mortality between immunosuppressed subcategories

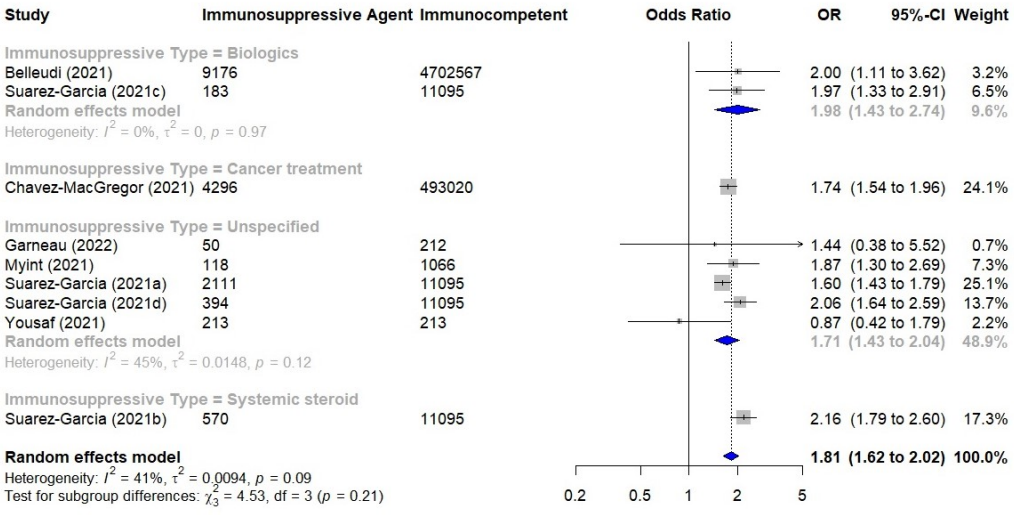
i. Forest Plot of excess COVID-19 associated mortality amongst subcategories of transplant patients as compared to immunocompetent controls



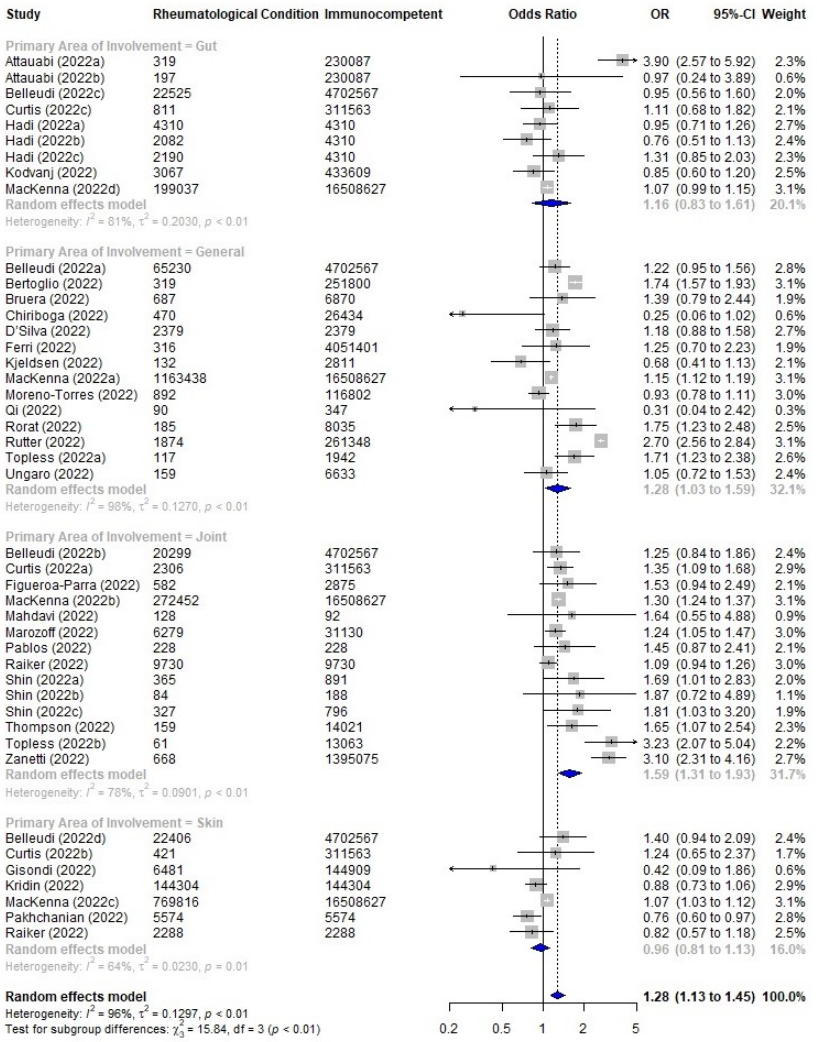
ii. Forest Plot of excess COVID-19 associated mortality amongst subcategories of malignancy patients as compared to immunocompetent controls



iii. Forest Plot of excess COVID-19 associated mortality amongst subcategories of patients receiving immunosuppressive agents as compared to immunocompetent controls

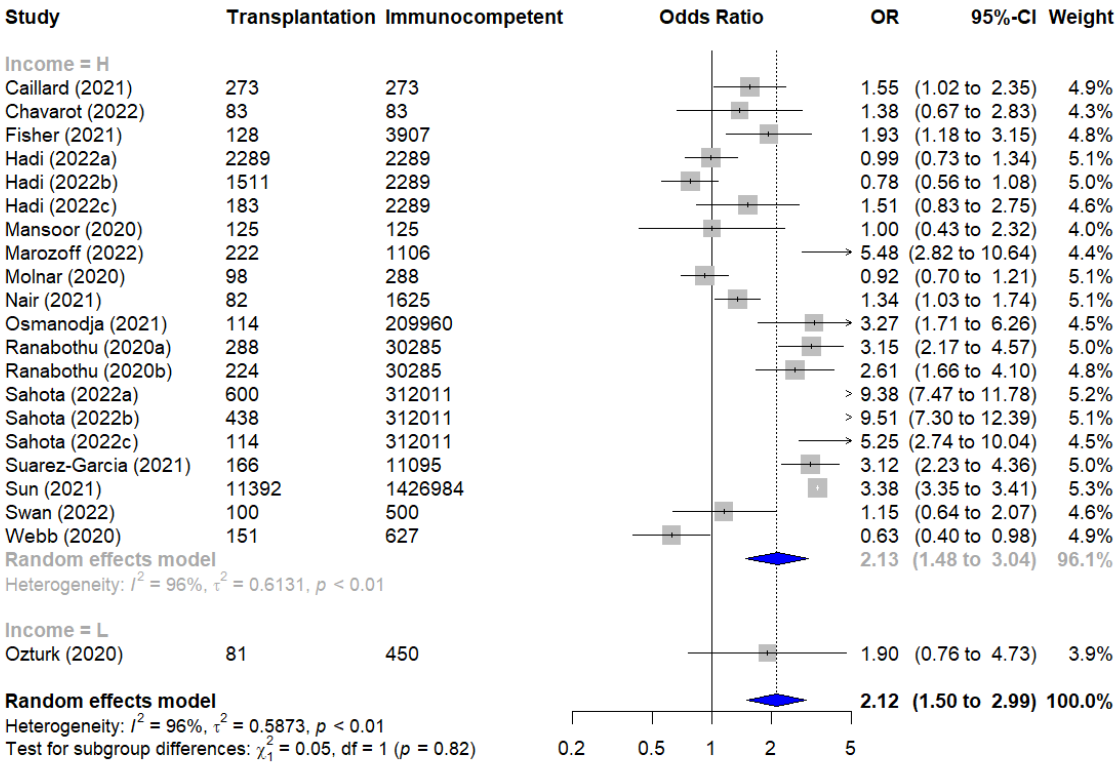


iv. Forest Plot of excess COVID-19 associated mortality amongst subcategories of rheumatology patients as compared to immunocompetent controls

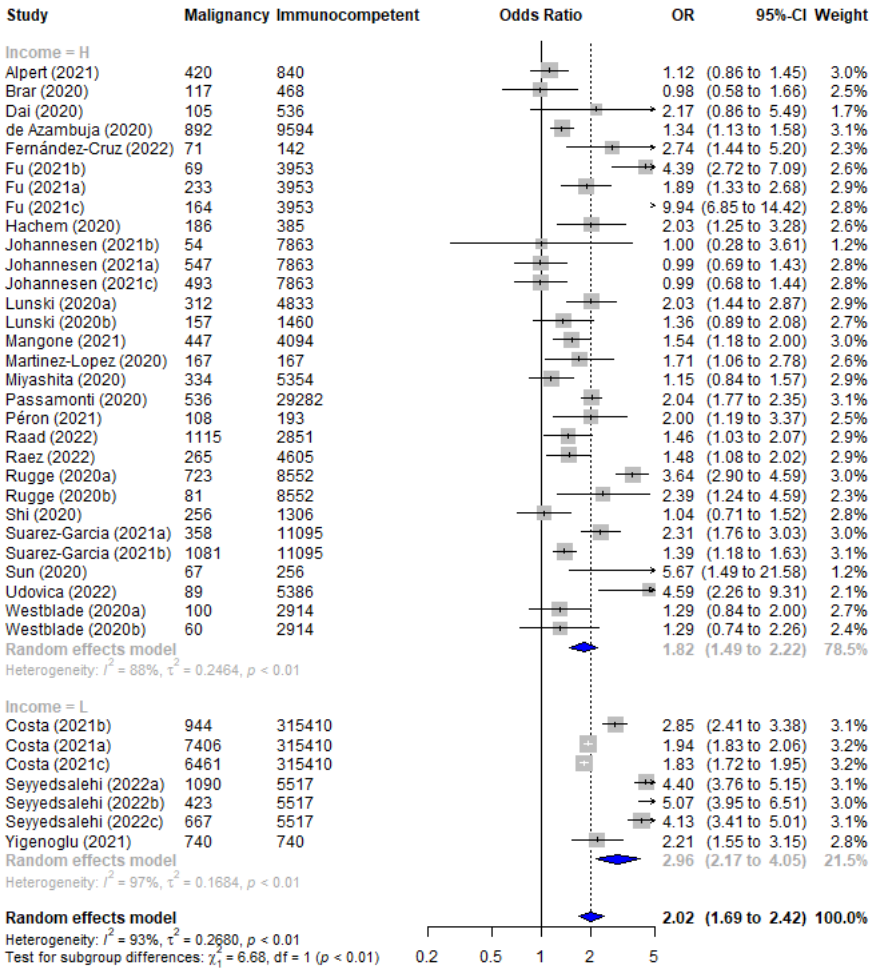


C. Attenuation of excess COVID-19 mortality by income category of study country

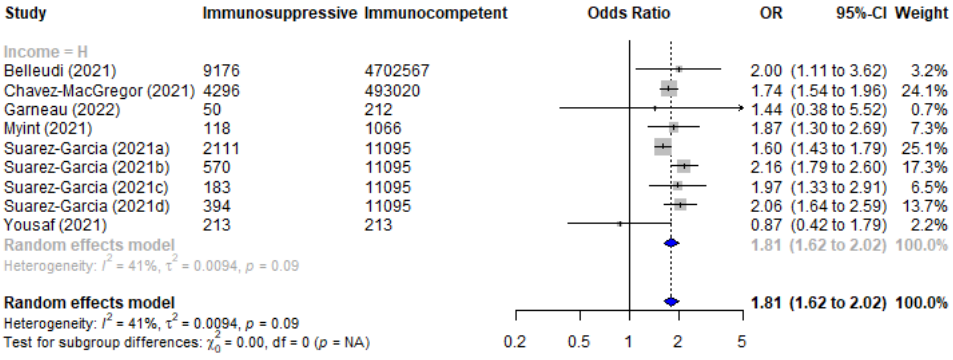
i. Subgroup analysis of COVID-19 associated mortality in transplant patients versus immunocompetent controls by income of study country



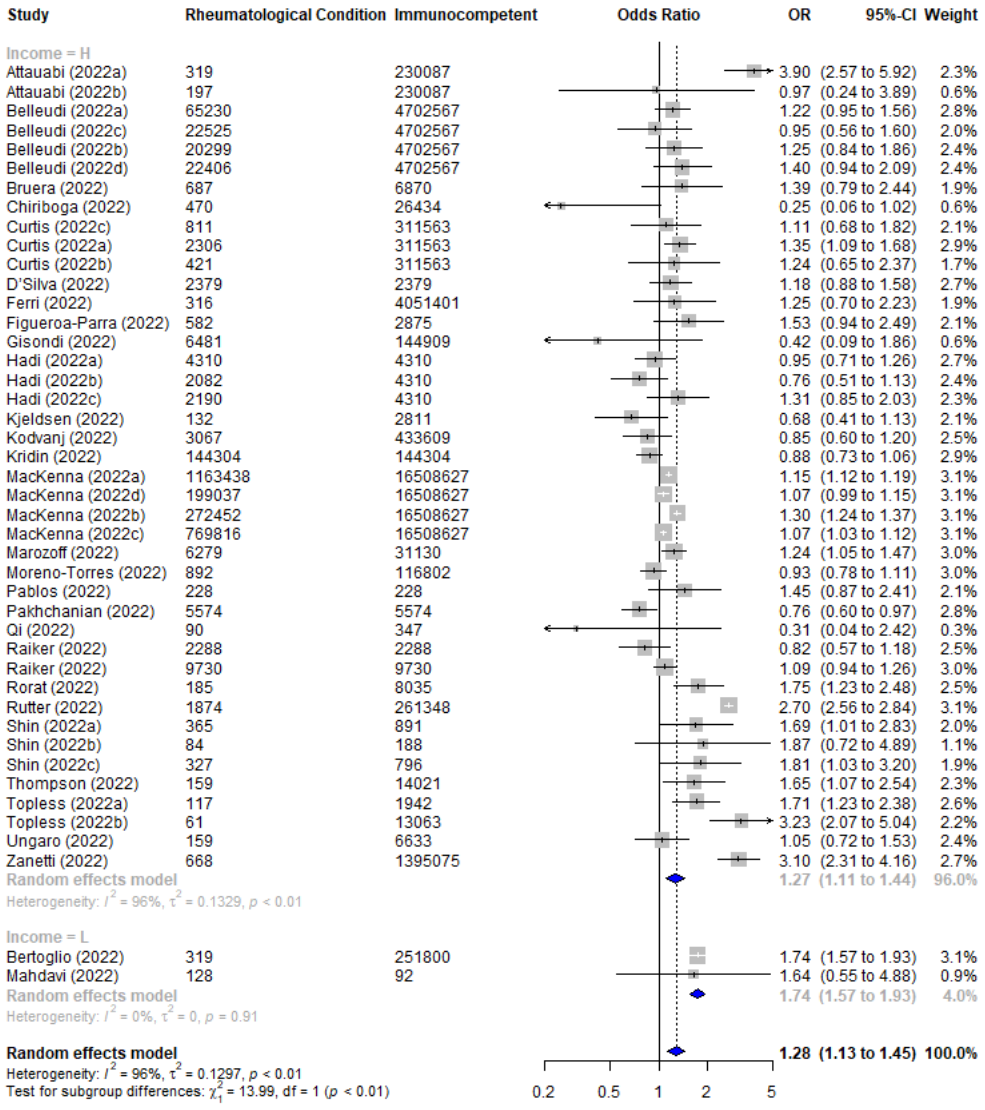
ii. Subgroup analysis of COVID-19 associated mortality in malignancy patients versus immunocompetent controls by income of study country



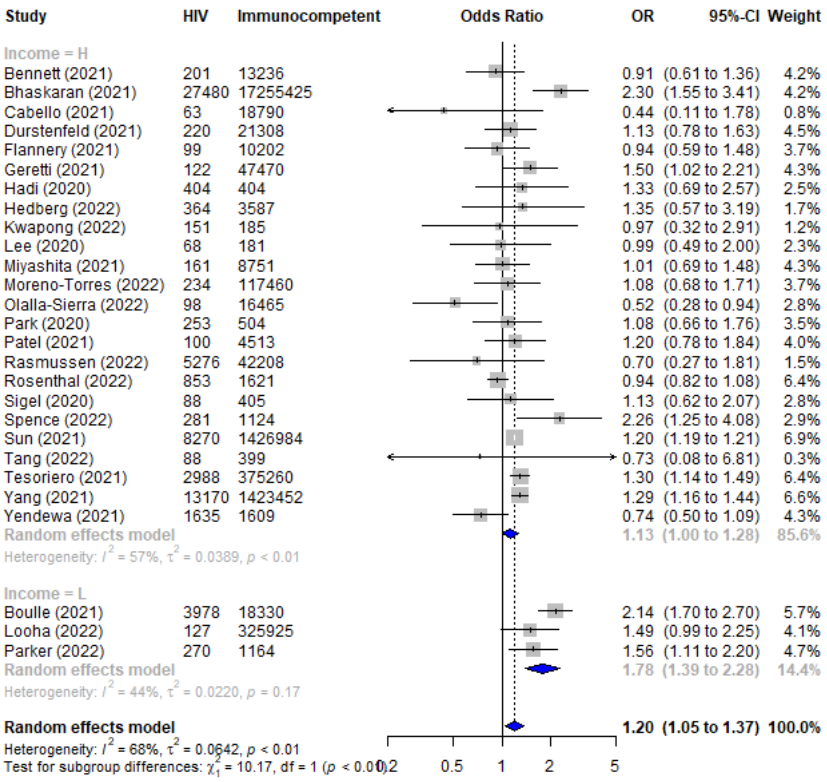
iii. Subgroup analysis of COVID-19 associated mortality in immunosuppressive agent patients versus immunocompetent controls by income of study country



iv. Subgroup analysis of COVID-19 associated mortality in rheumatological patients versus immunocompetent controls by income of study country

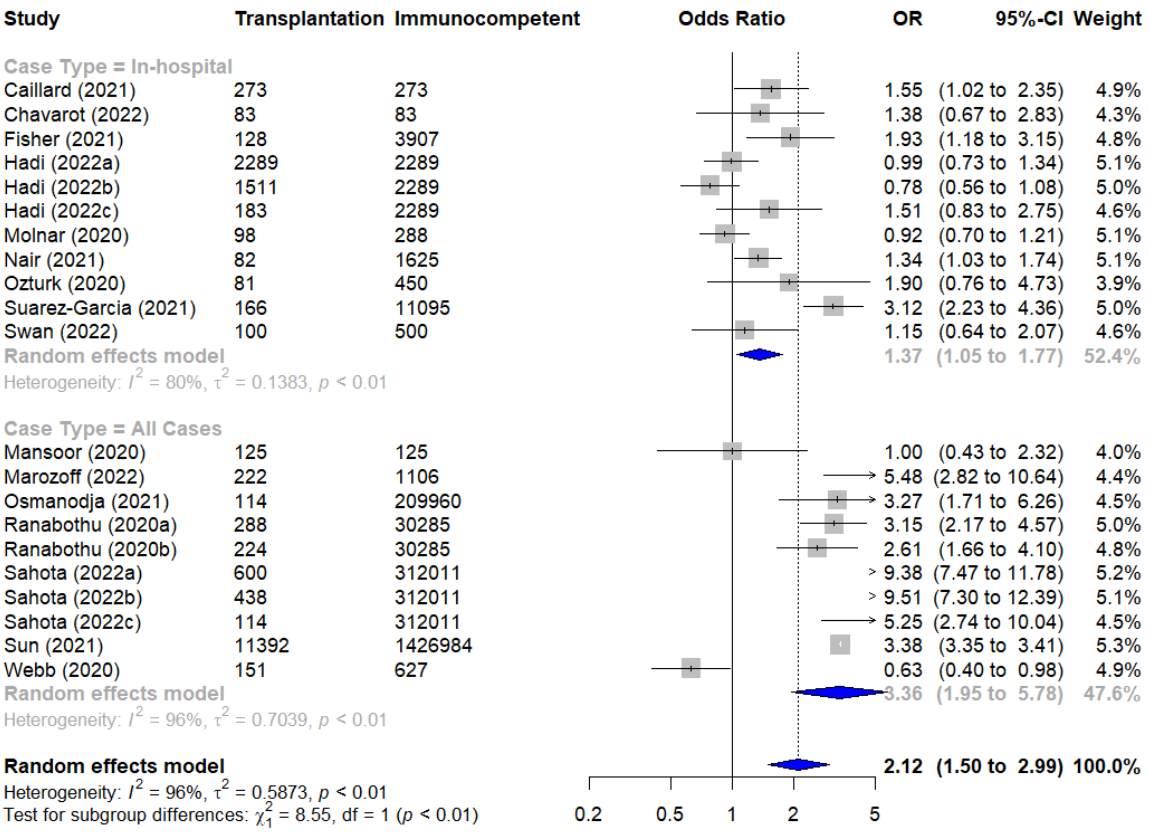


v. Subgroup analysis of COVID-19 associated mortality in HIV patients versus immunocompetent controls by income of study country

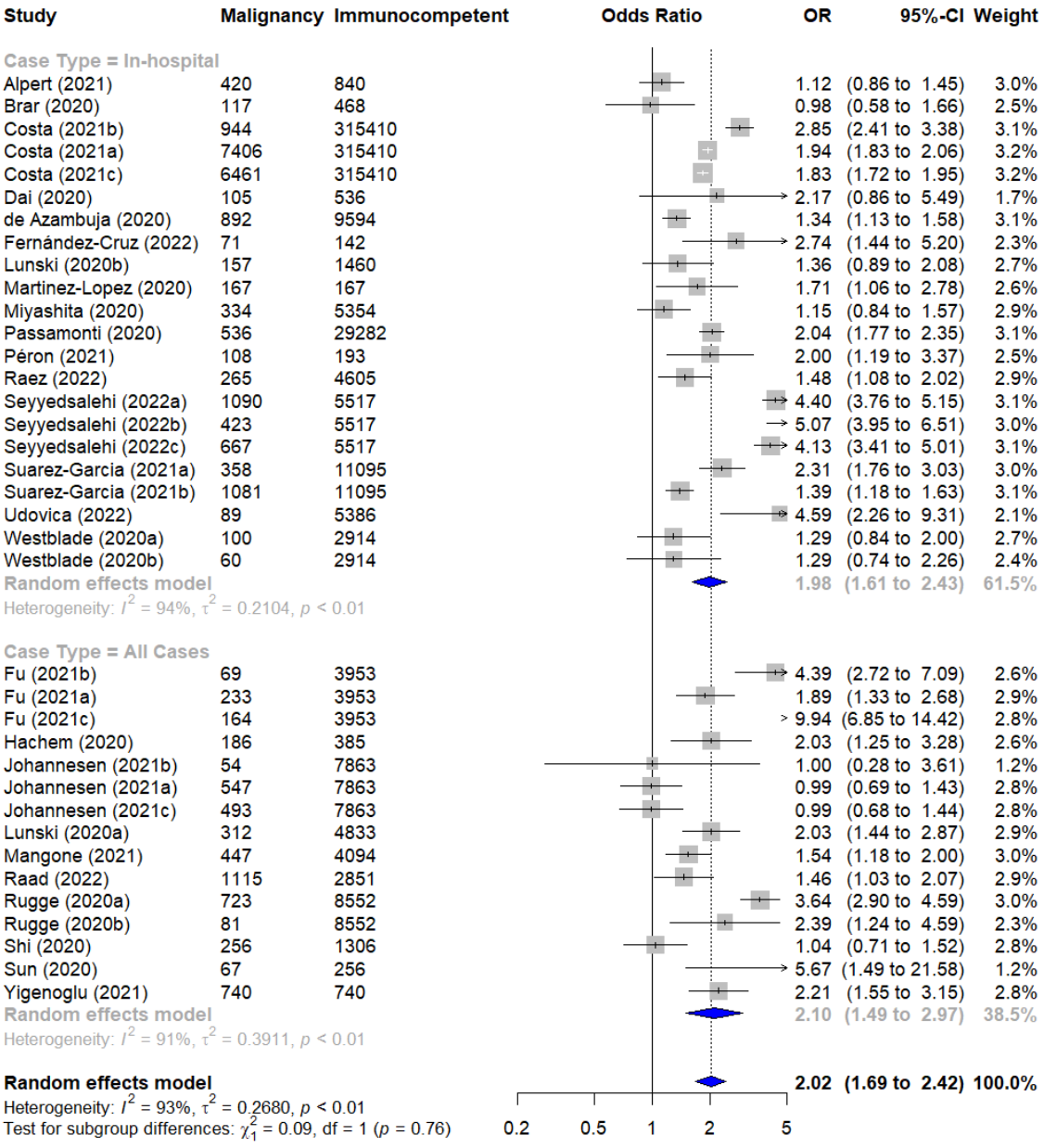


D. Attenuation of excess COVID-19 mortality by COVID-19 case type

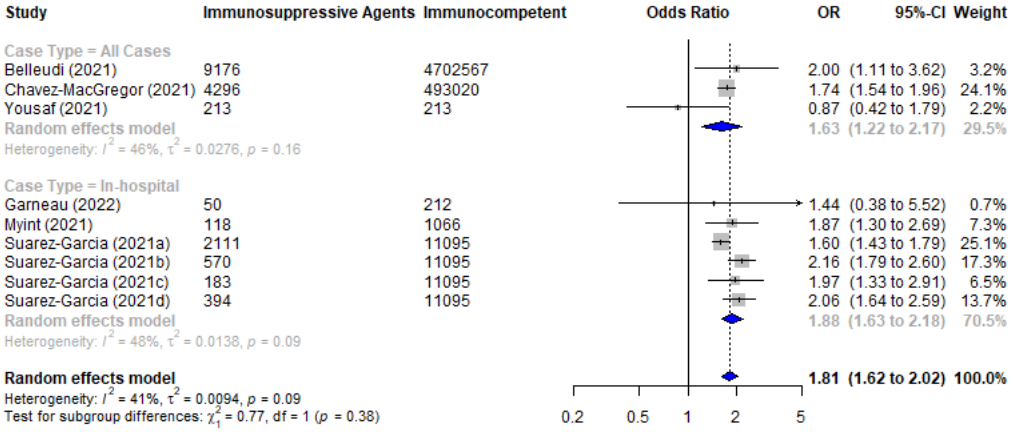
i. Subgroup analysis of COVID-19 associated mortality in transplant patients versus immunocompetent controls by case type



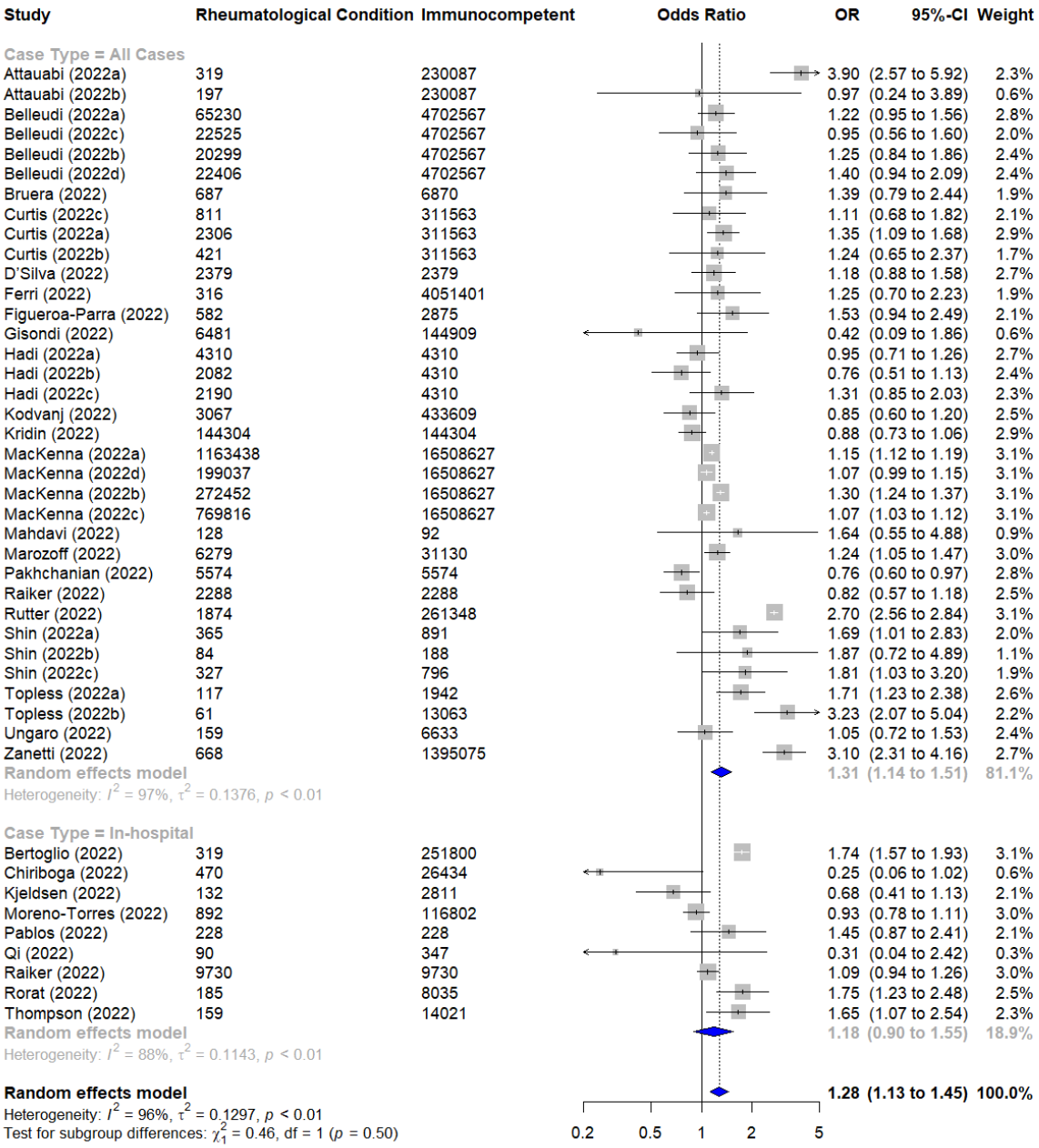
ii. Subgroup analysis of COVID-19 associated mortality in patients with malignancies versus immunocompetent controls by case type



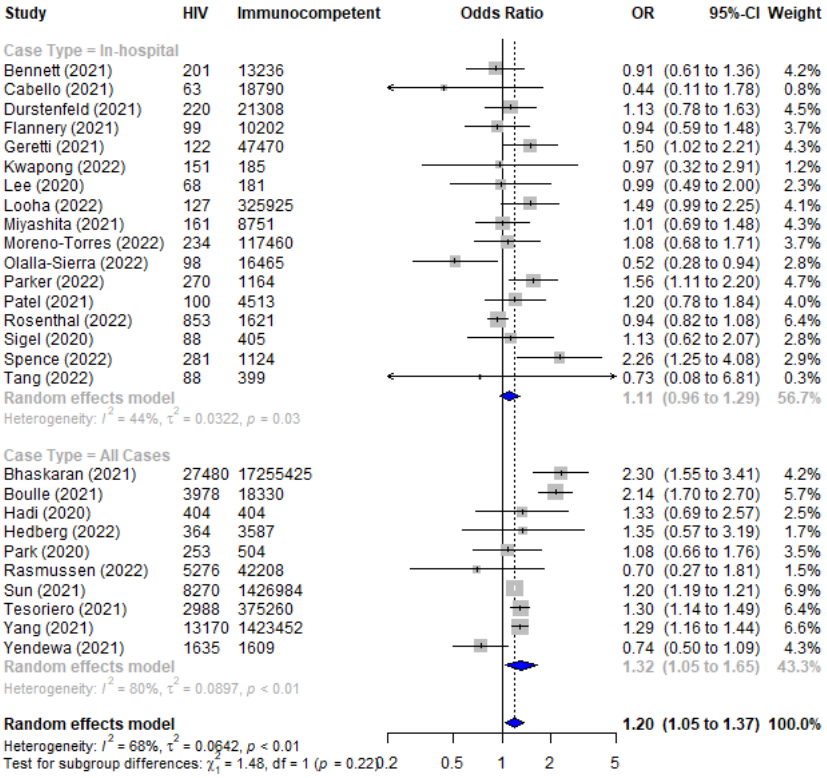
iii. Subgroup analysis of COVID-19 associated mortality in patients on immunosuppressives versus immunocompetent controls by case type



iv. Subgroup analysis of COVID-19 associated mortality in rheumatology patients versus immunocompetent controls by case type

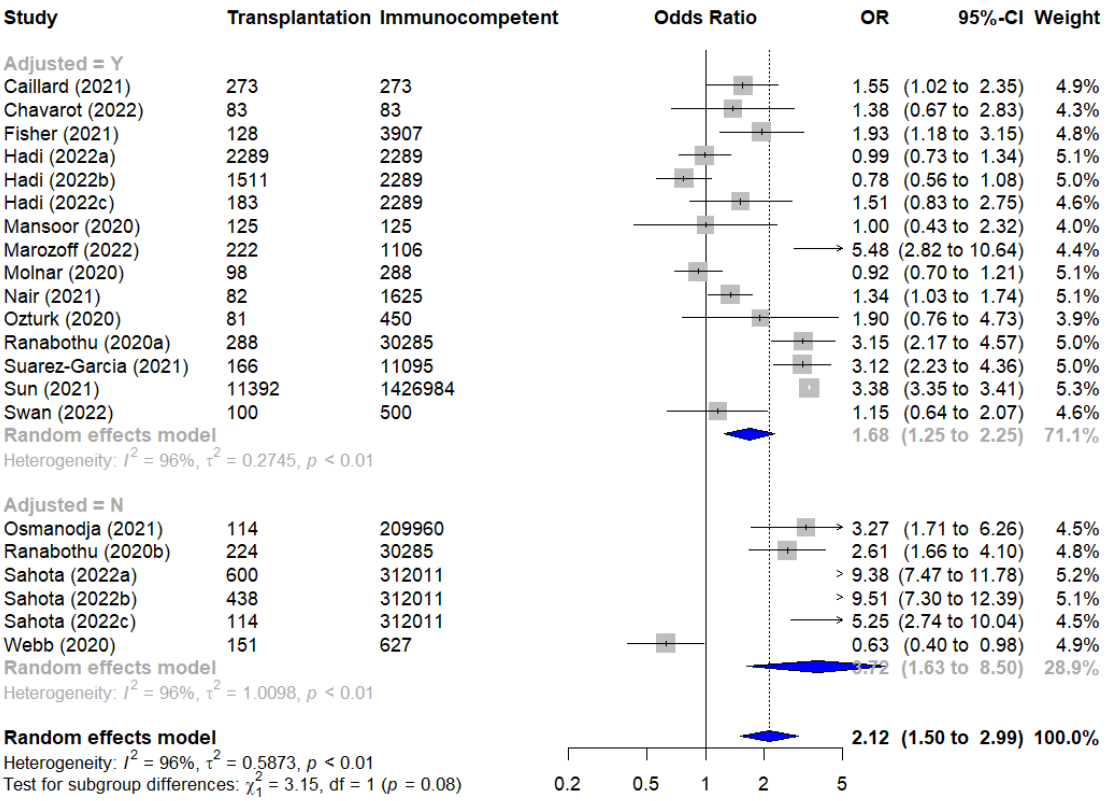


v. Subgroup analysis of COVID-19 associated mortality in HIV patients versus immunocompetent controls by case type

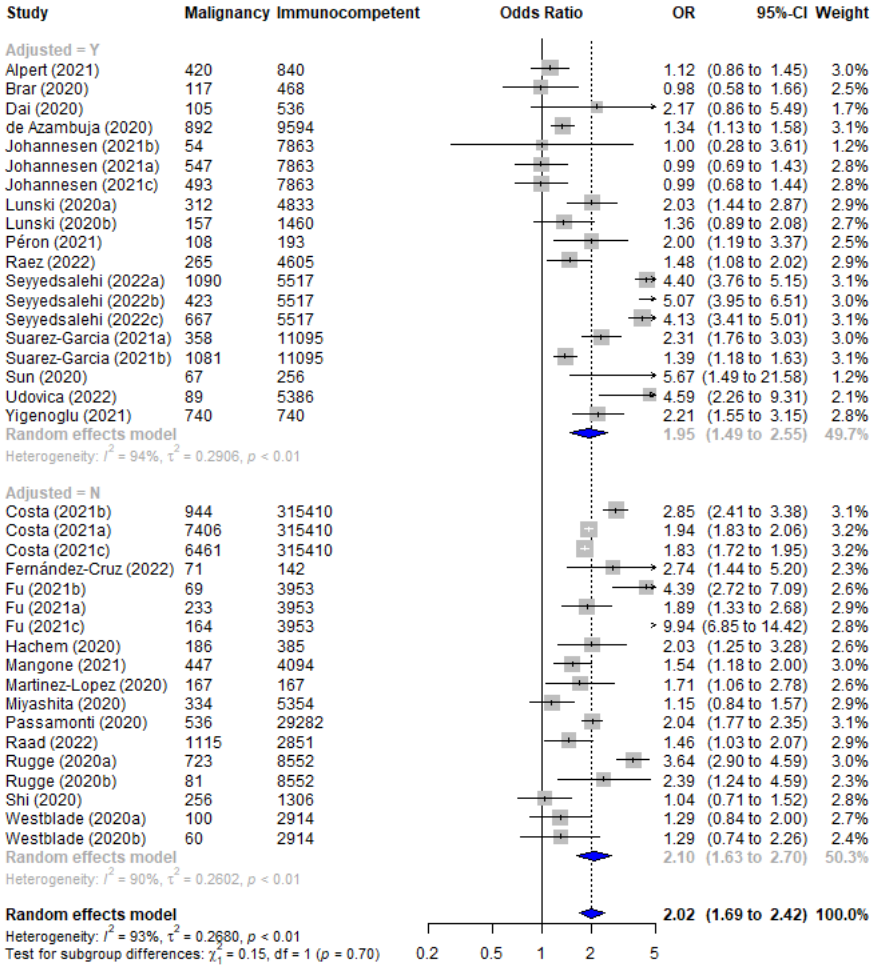


E. Attenuation of excess COVID-19 mortality by level of data adjustment

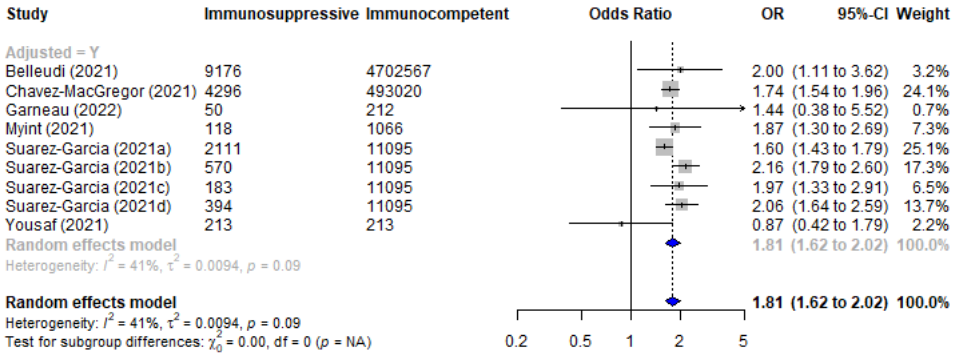
i. Subgroup analysis of COVID-19 associated mortality in transplant patients versus immunocompetent controls by data adjustment



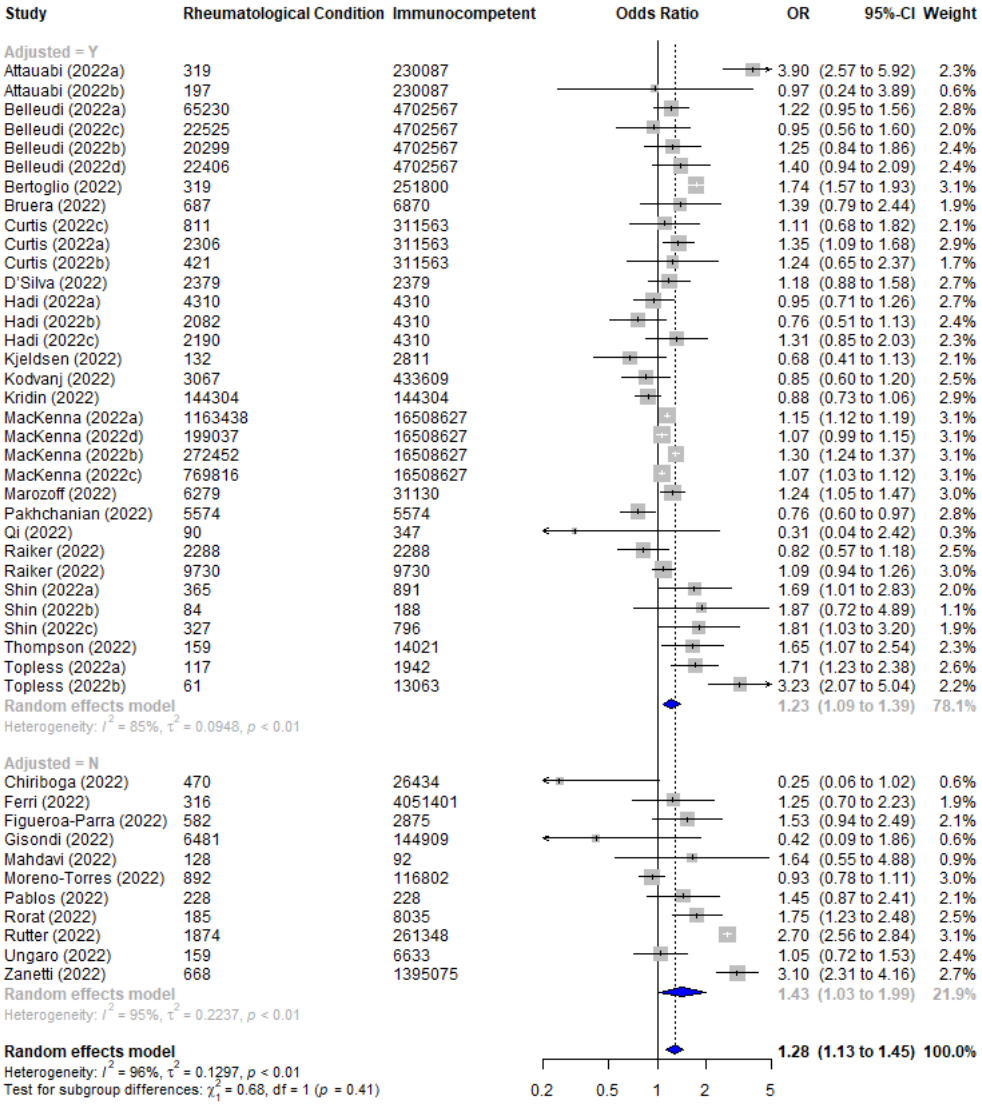
ii. Subgroup analysis of COVID-19 associated mortality in malignancy patients versus immunocompetent controls by data adjustment



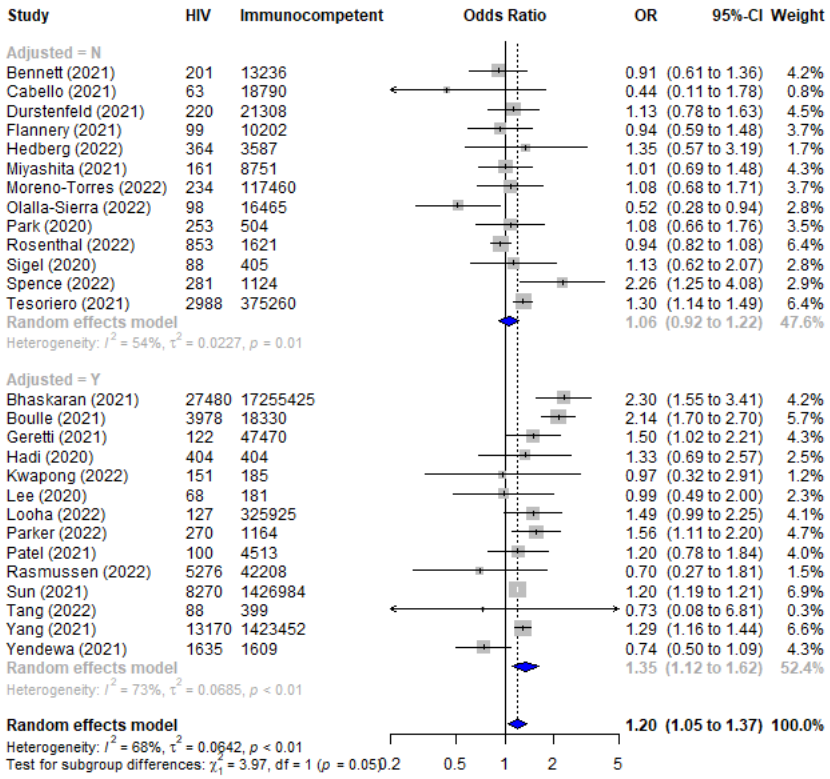
iii. Subgroup analysis of COVID-19 associated mortality in immunosuppressive agent patients versus immunocompetent controls by data adjustment



iv. Subgroup analysis of COVID-19 associated mortality in rheumatological patients versus immunocompetent controls by data adjustment

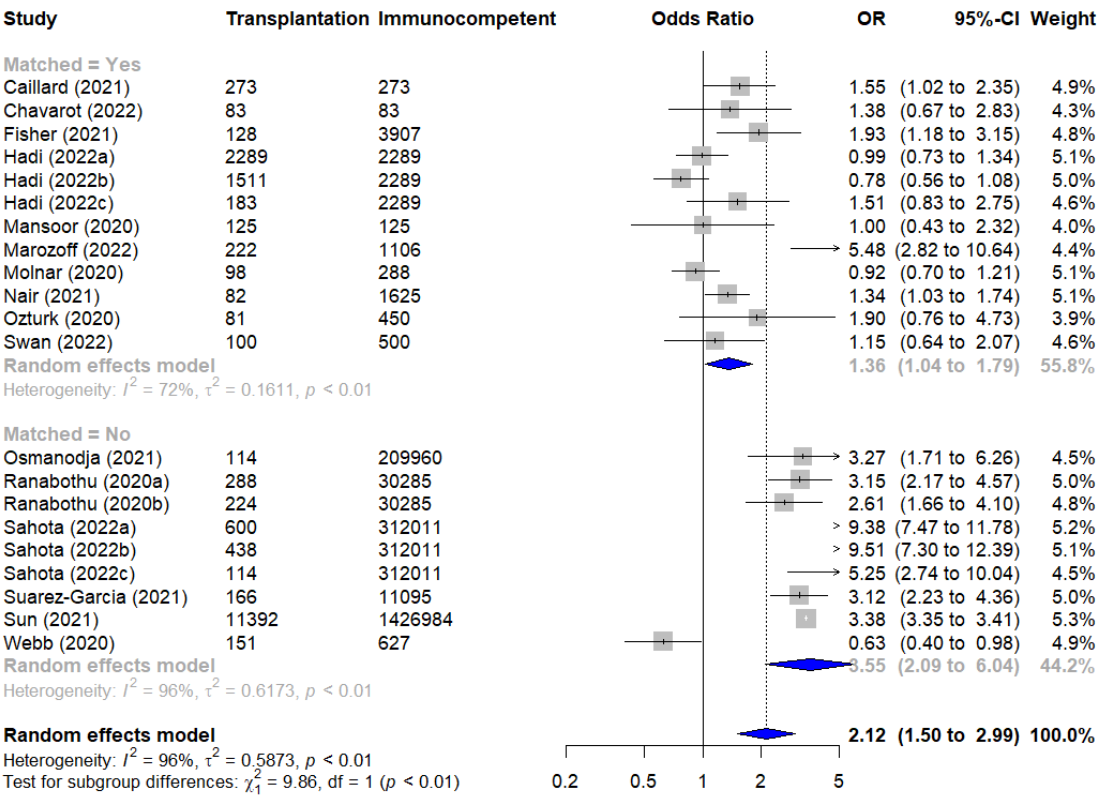


v. Subgroup analysis of COVID-19 associated mortality in HIV patients versus immunocompetent controls by data adjustment

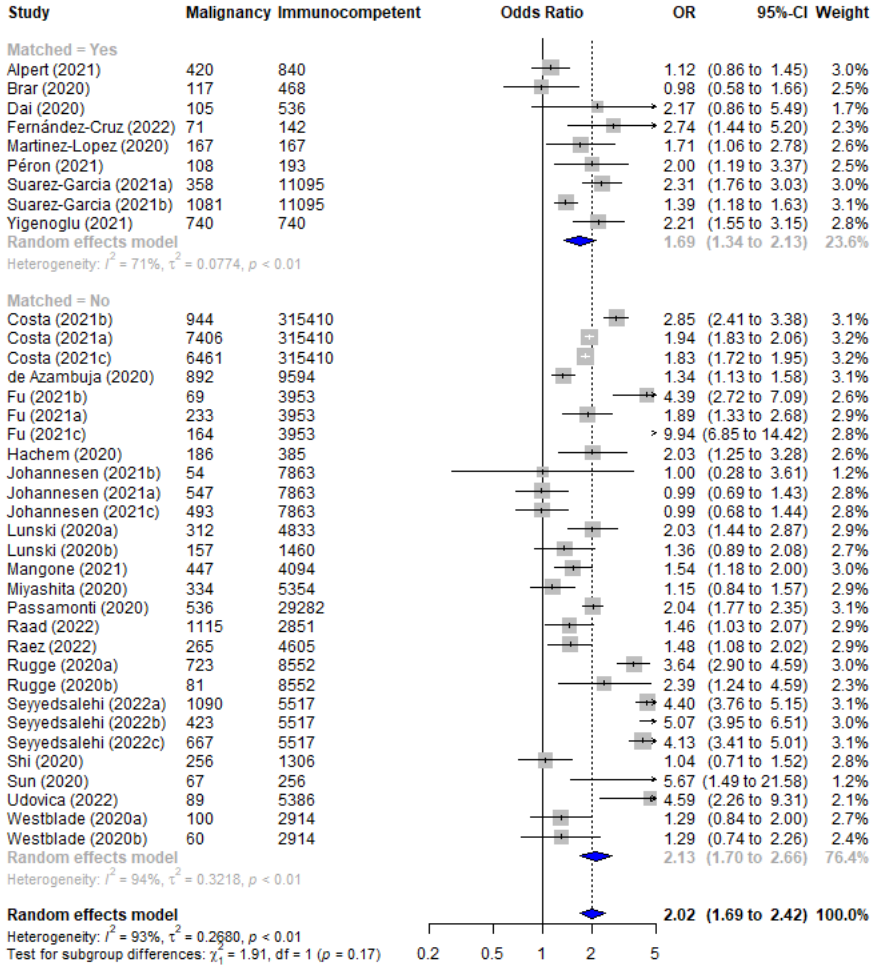


F. Attenuation of excess COVID-19 mortality by level of data matching

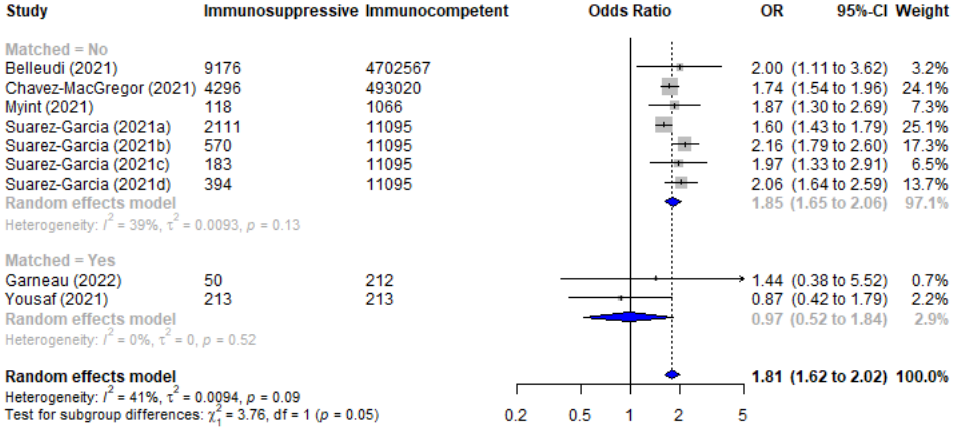
i. Subgroup analysis of COVID-19 associated mortality in transplant patients versus immunocompetent controls by data matching



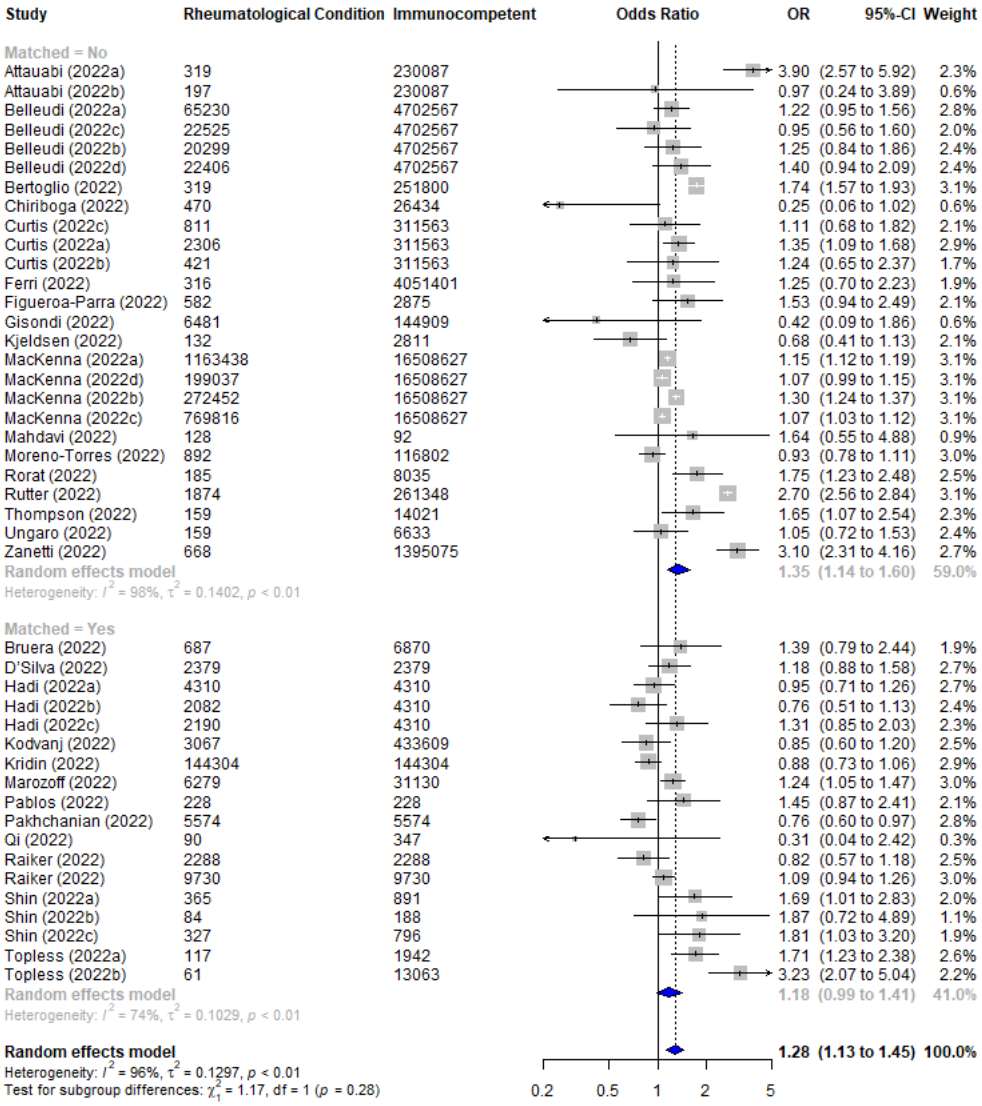
ii. Subgroup analysis of COVID-19 associated mortality in malignancy patients versus immunocompetent controls by data matching



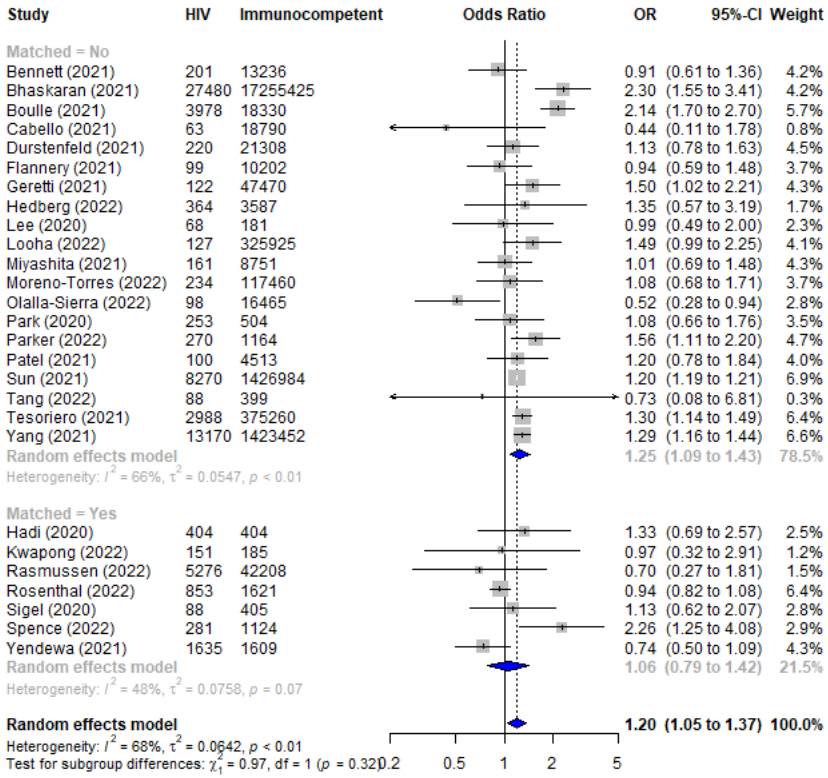
iii. Subgroup analysis of COVID-19 associated mortality in immunosuppressive agent patients versus immunocompetent controls by data matching



iv. Subgroup analysis of COVID-19 associated mortality in rheumatological patients versus immunocompetent controls by data matching

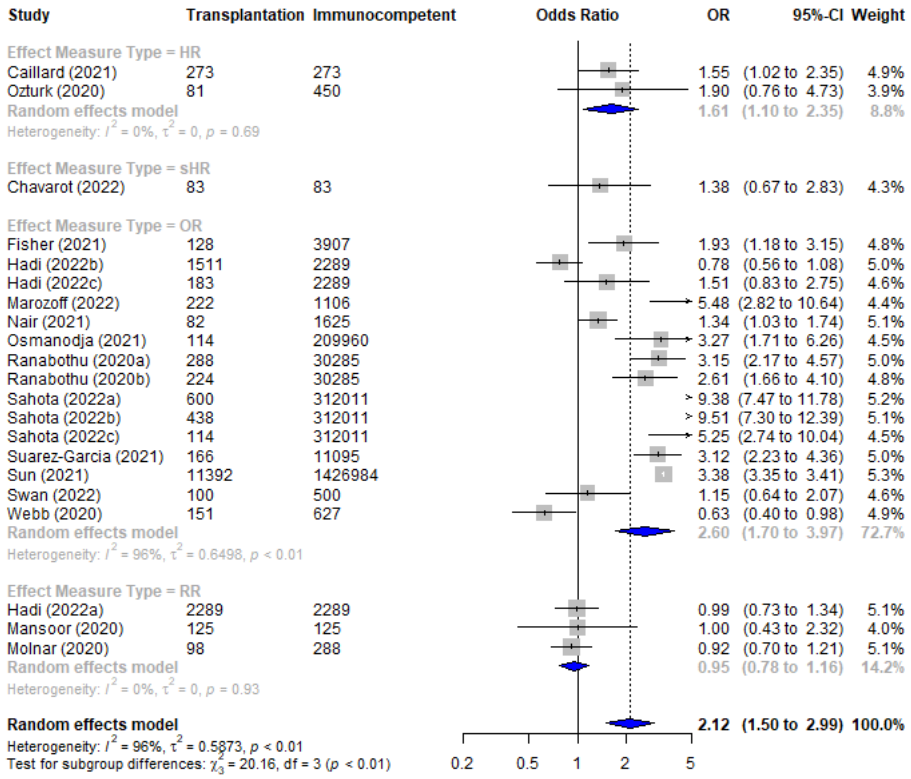


v. Subgroup analysis of COVID-19 associated mortality in HIV patients versus immunocompetent controls by data matching

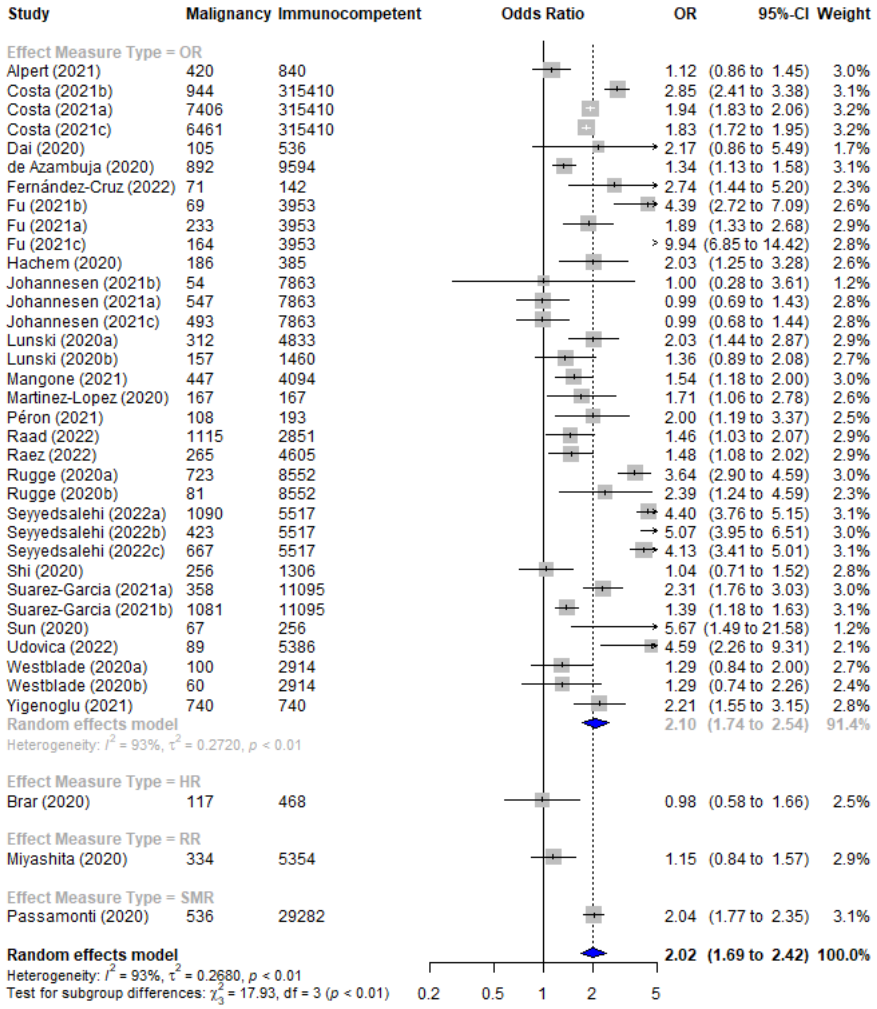


G. Attenuation of excess COVID-19 mortality by effect measure type

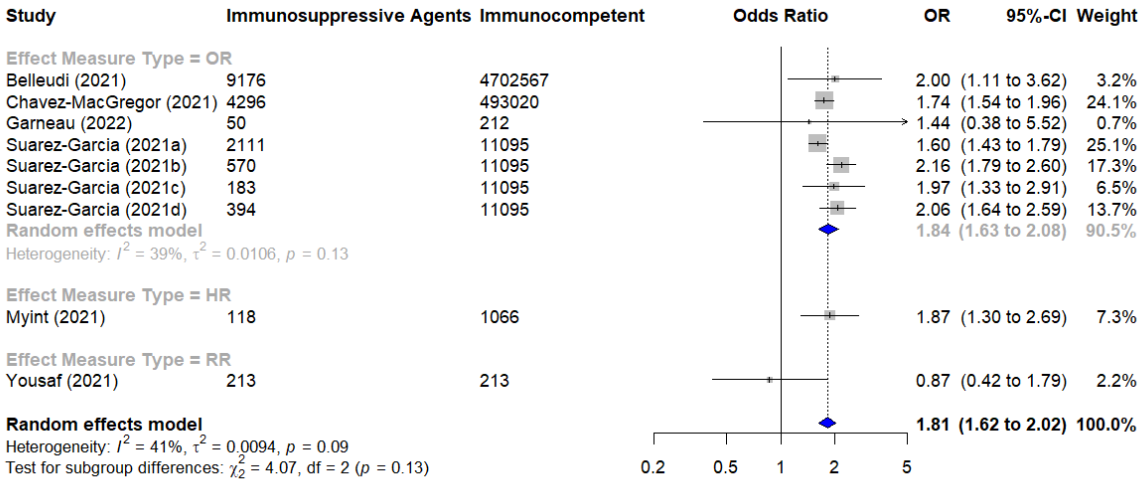
i. Subgroup analysis of COVID-19 associated mortality in transplant patients versus immunocompetent controls by effect measure type



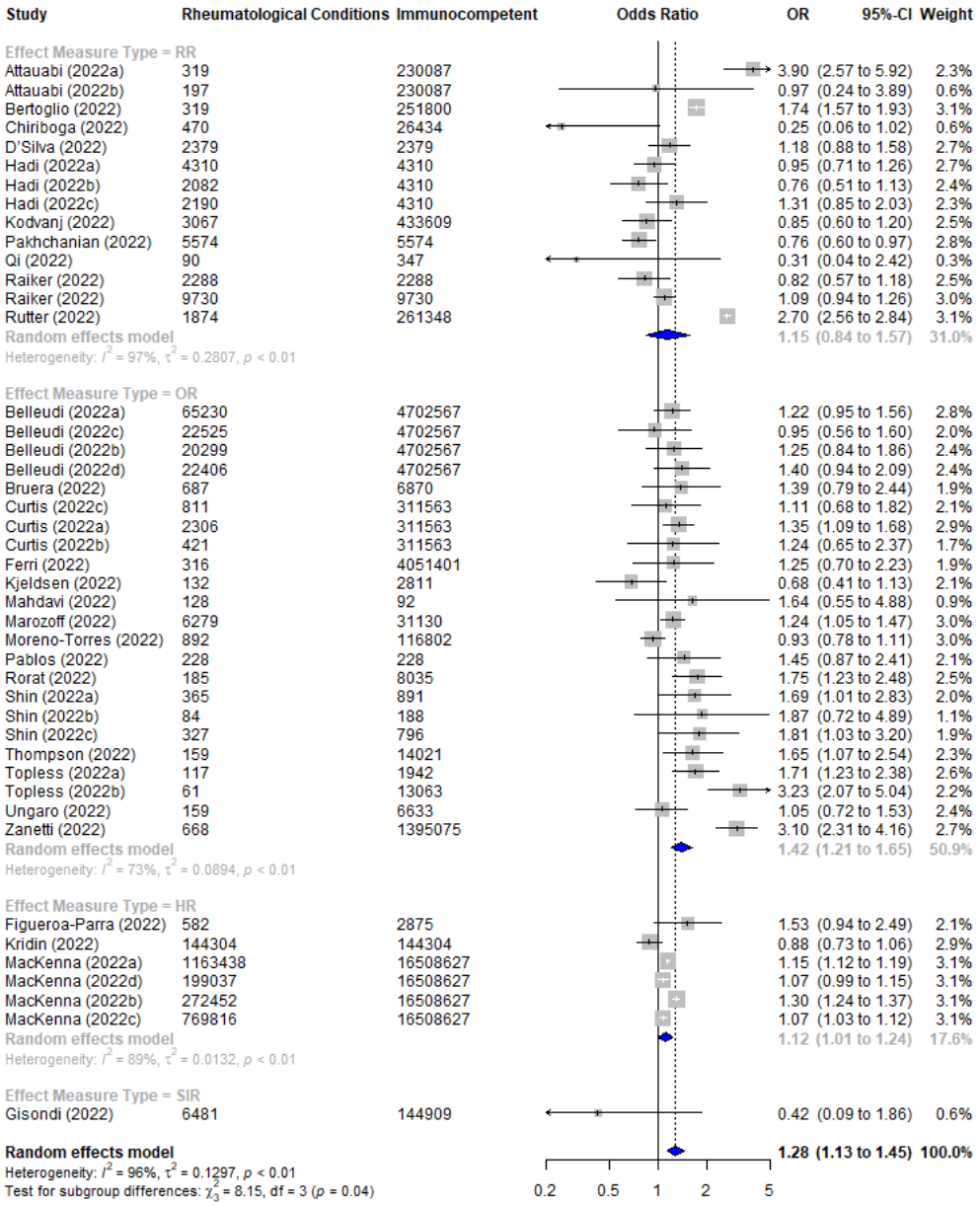
ii. Subgroup analysis of COVID-19 associated mortality in malignancy patients versus immunocompetent controls by effect measure type



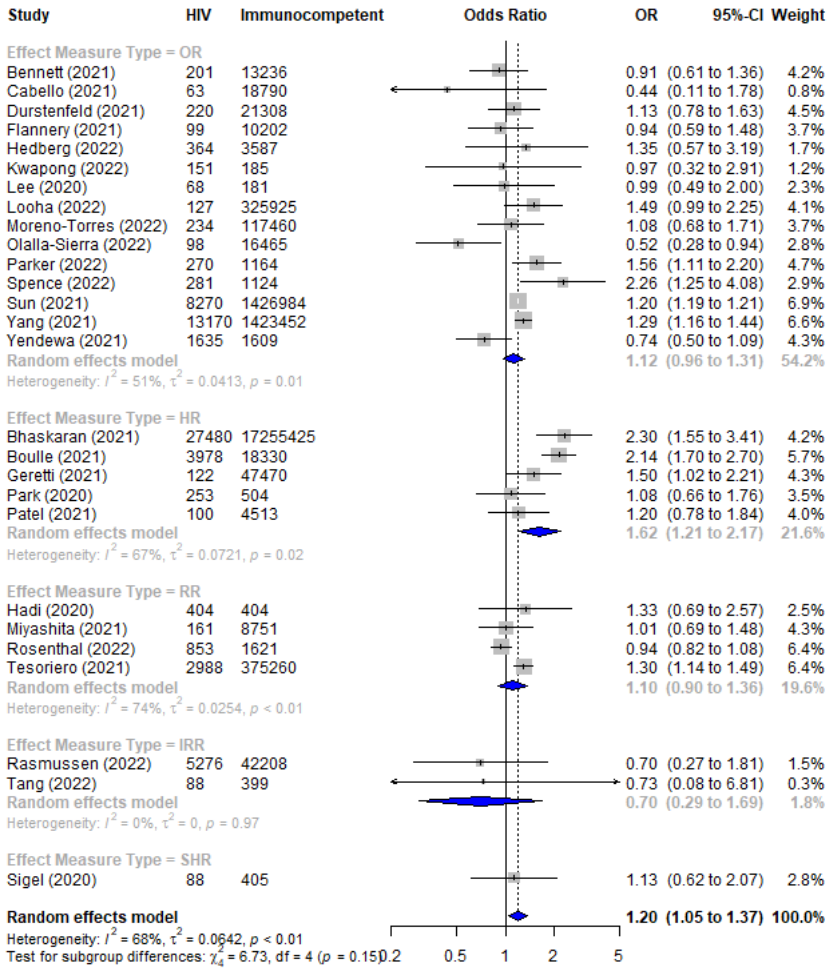
iii. Subgroup analysis of COVID-19 associated mortality in immunosuppressive agent patients versus immunocompetent controls by effect measure type



iv. Subgroup analysis of COVID-19 associated mortality in rheumatological patients versus immunocompetent controls by effect measure type



v. Subgroup analysis of COVID-19 associated mortality in HIV patients versus immunocompetent controls by effect measure type

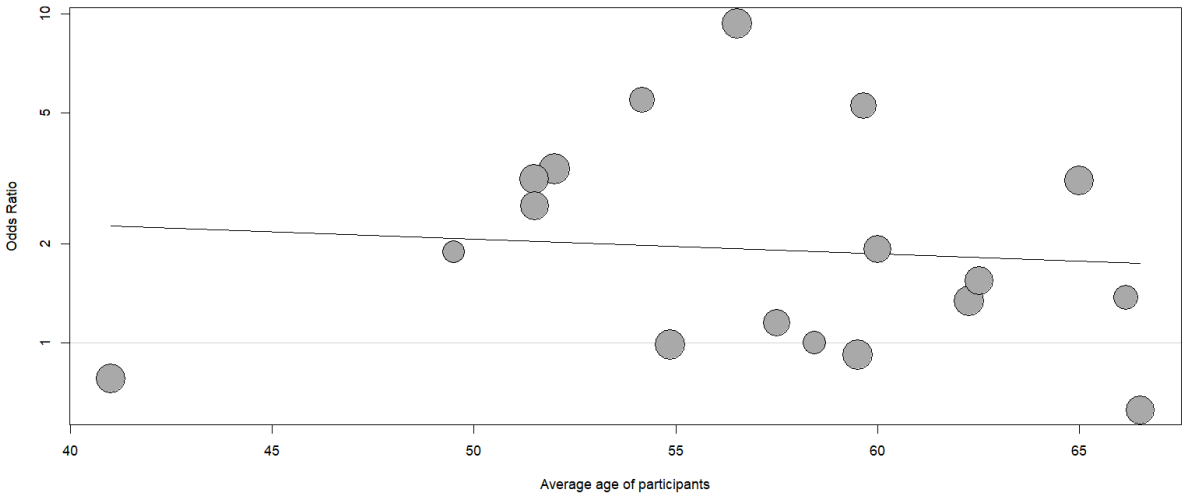


Appendix 10: Modelling for the influence of age over excess COVID-19 associated mortality between immunosuppressed categories

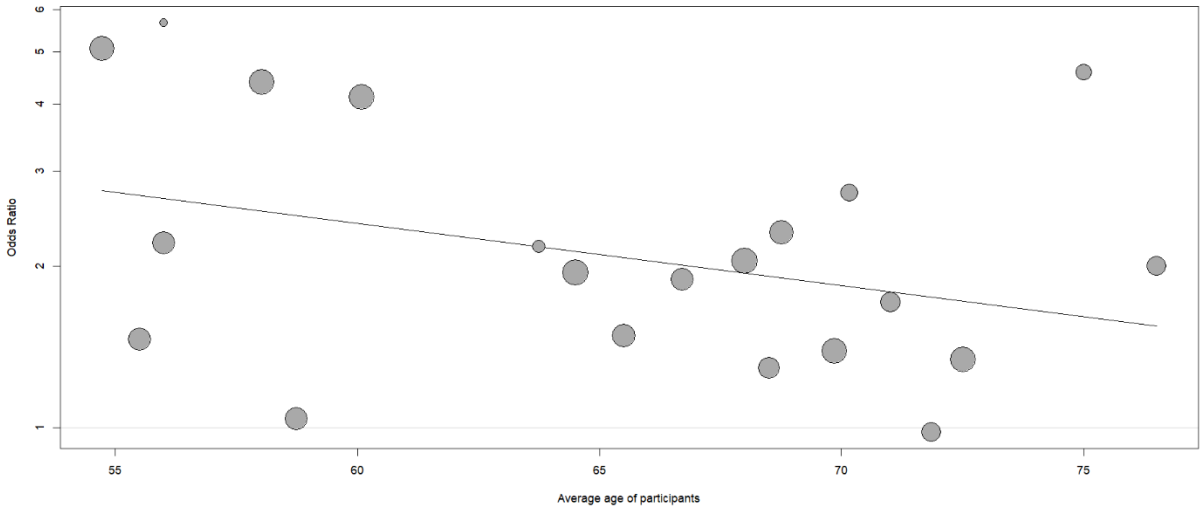
Table 1: Summary of meta-regression outputs between average age of study participants and excess COVID-19 associated mortality across immunosuppressed categories

Immunosuppression	Estimate	Standard Error	*p-value*	Lower slope	Upper slope
Transplantation	-0.01	0.0029	0.72	-0.07	0.05
Malignancy	-0.03	0.02	0.09	-0.06	0.09
Immunosuppressive Agents	-0.0029	0.0067	0.66	-0.02	0.01
Rheumatological conditions	-0.005	0.01	0.71	-0.03	0.02
HIV	-0.01	0.113	0.24	-0.035	0.009

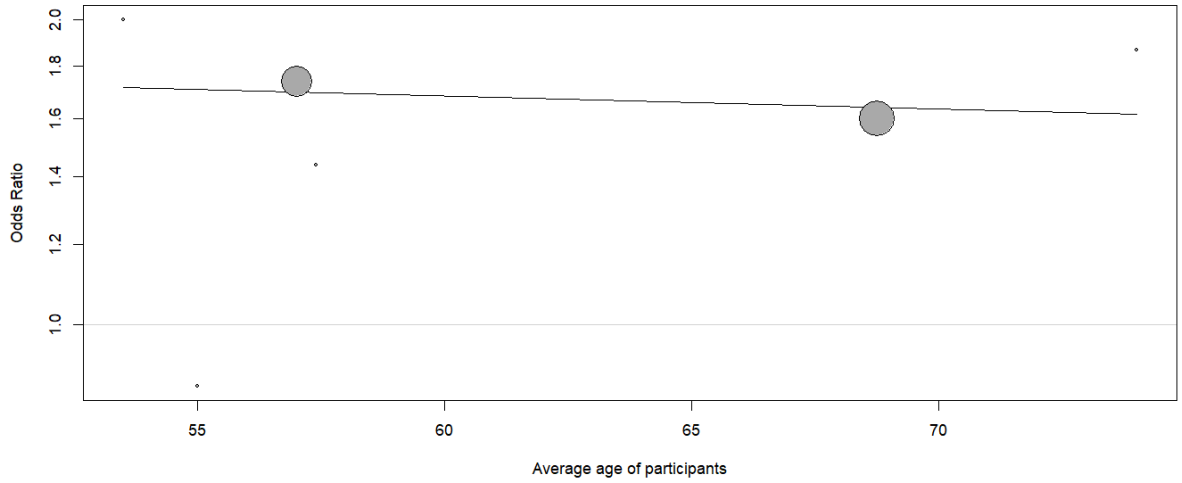
i. Bubble Plot of impact of average age of study participants over excess COVID associated mortality amongst transplant recipients



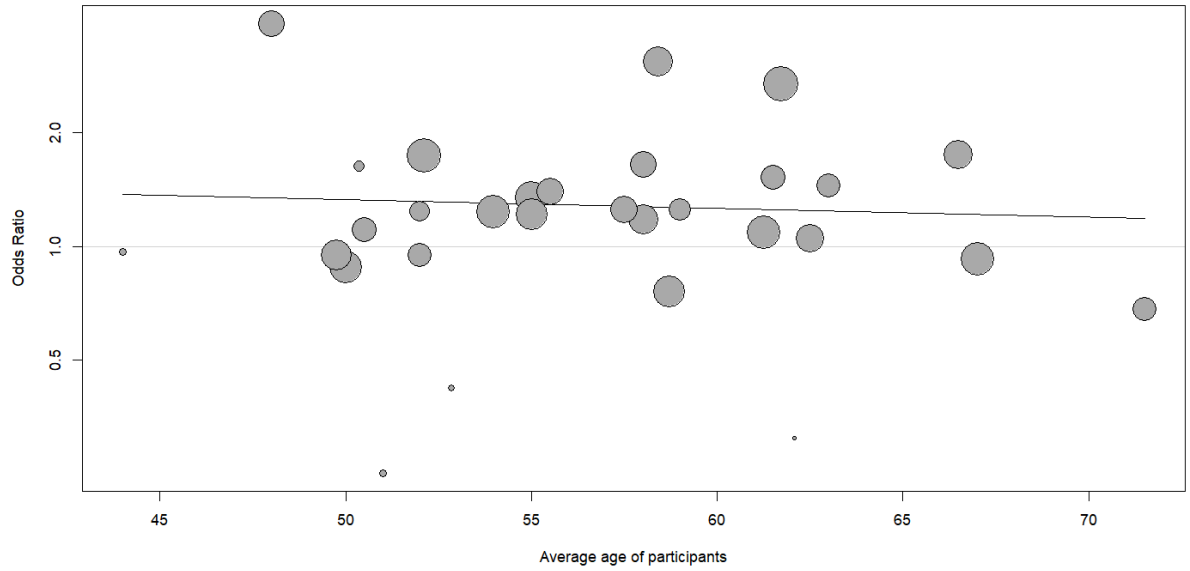
ii. Bubble Plot of impact of average age of study participants over excess COVID associated mortality amongst patients with malignancies



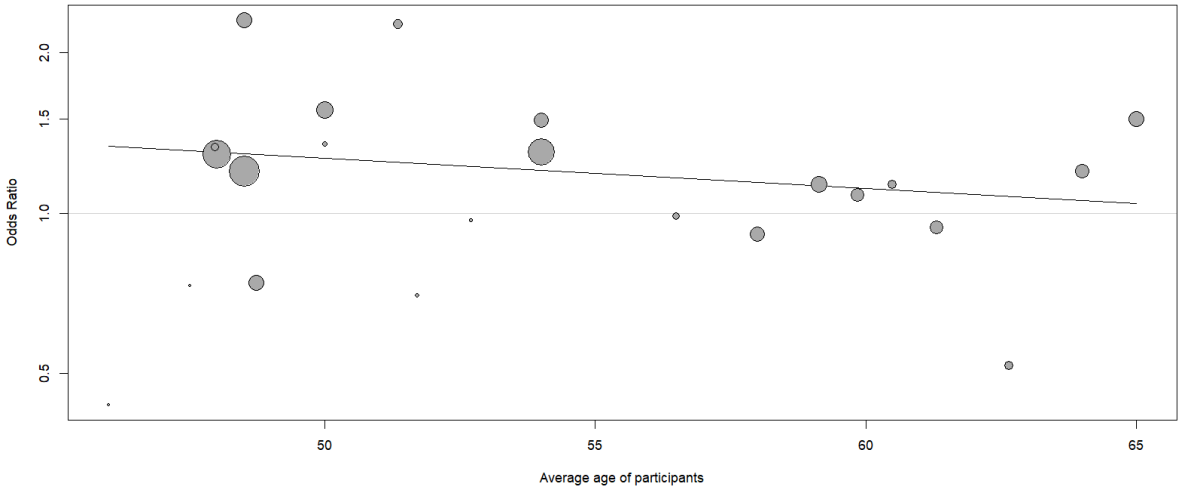
iii. Bubble Plot of impact of average age of study participants over excess COVID associated mortality amongst immunosuppressive recipients



iv. Bubble Plot of impact of average age of study participants over excess COVID associated mortality amongst rheumatology patients



v. Bubble Plot of impact of average age of study participants over excess COVID associated mortality amongst HIV patients



Appendix 11: DESTINIES Study pre-read materials & consent form

Meredith Leston, Primary Investigator

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PANNELLIST INFORMATION SHEET

The Inaugural UK e**DE**lphi **ST**udy to Def**IN**e and Risk-Stratify **I**mmunosuppr**ES**sion (**the DESTINIES study**):

We are delighted that you will be participating in this eDelphi study to address global inconsistencies in how immunosuppression is characterised and subdivided as a clinical risk group. It is our intention that this work will deliver an internationally aligned, clinically meaningful and medical record compatible means of identifying immunosuppressed patients and subdividing their health outcomes by reported vulnerability to severe COVID-19 infection.

Why have I been invited?

You have been asked to participate in this study in recognition of your track record in immunology, vaccinology and/or clinical risk prioritisation or your affiliation with the decision-making bodies listed:

- World Health Organisation (WHO) Global Advisory Committee on Vaccine Safety (GACVS)
- Coalition for Epidemic Preparedness Innovations (CEPI) Scientific Advisory Committee
- The Global Immunocompromised Health Coalition (GHIC)
- The European Alliance of Associations for Rheumatology (EULAR)
- European Medicines Agency's (EMA) Vaccines Working Party (VWP)
- Joint Committee on Vaccination and Immunisation (JCVI)
- COVID-19 Neutralising Monoclonal Antibodies (nMABs) and Antivirals Access Independent Advisory Group
- UK Scientific Advisory Group for Emergencies (SAGE)
- Independent Scientific Advisory Group for Emergencies (Indie_SAGE)
- Centers for Disease Control and Prevention (CDC) Advisory Committee on Immunization Practices (ACIP)
- Food and Drug Administration (FDA) Vaccine Advisory Panel
- The Nuffield Department of Primary Care Health Sciences
- The Nuffield Department of Medicine

How do I take part?

We kindly request that our panellists read all the materials included in this document before the first eDelphi round begins. These resources have been specially compiled to provide panellists with background information on the study, digital phenotyping, differential vulnerability to COVID-19 in the immunosuppressed and the strengths of consensus exercises.

For the two questionnaire rounds of this eDelphi study, you will be emailed a personal link to Google Forms to submit your answers (approx. 15 minutes each). You will be given a period of two weeks to do so. You will also be allocated a Panellist ID number for your anonymity and study management purposes. However, should you have any discomfort with completing this Google Form, you also have the option to request a paper-based version of this survey to complete and return to researchers. Please contact the Primary Investigator at the details provided as soon as possible if you would like to participate by this route.

In the two weeks between questionnaire rounds, you will be provided with a summary of the data collected from the previous round, including distributions of how the panel has scored each questionnaire item and how your own score compares. You will also be provided with two draft phenotypes of immunosuppression in adults. Both will COVID risk-stratify immunosuppressed conditions based on panellist answers from the previous round; the first will do so as a higher vs lower risk binary, the second in multiple levels. You will be asked to evaluate the accuracy of these drafts in the next round.

For the final discussion group portion of this study (hosted virtually via Microsoft Teams), all panellists will be presented with three, time-zone adjusted options to choose from. The option that receives the most votes will be taken forward; panellists unable to attend this timeslot will be provided with an additional Google Form to address the questions that will be discussed or a paper-based alternative. To retain panellist anonymity, all those joining these online discussion groups will be instructed to keep their cameras switched off.

What are the key study dates?

- 24th May - *first round begins*
- 7th June - *end of first round*
- 14th June - *dissemination of interim results and draft phenotypes*
- 21st June - *second round begins*
- 5th July - *end of second round*
- 12th July - *dissemination of interim results, draft phenotypes and booking poll for final discussion groups*
- w/c 22nd July - *3x final discussion groups (panel divided by time zone) and dissemination of final google form for those unable to participate.*
- 26th July - *end of study.*

What are the possible benefits of taking part?

Your participation will provide the evidence base needed to surface an internationally aligned and computerised medical record compatible definition for immunosuppression in adults and a clinically meaningful form of subdivision. Based on panellists' instruction, digital phenotypes for a COVID Risk Hierarchy and a Higher vs Lower Risk Binary will be constructed and implemented into national disease surveillance flows. These digital phenotypes will be published on dedicated online libraries (BioPortal/ PhenoFlow), with due attribution given to all consenting panellists. Likewise, panellists that are willing to be named will be listed as co-authors on all experimental outputs; those that prefer to remain anonymous will have their contribution acknowledged under the umbrella term 'The DESTINIES Consortium'.

Will my taking part in the study be kept confidential?

The use of Panellist ID numbers throughout this study ensures that panellists can remain anonymous while giving their professional opinion. Only researchers will have access to identifying information during data collection. However, panellists that wish to be named in experimental outputs and publications will be given due attribution and co-author status. Those that do not will be acknowledged under 'The DESTINIES Consortium' umbrella, as mentioned.

All study data will be kept safely on a secure computer network; only those who have passed the necessary security checks will have access to this research environment. Responsible members of the University of Oxford may be given access to your answers for monitoring and/or audit of the study to ensure that the research is complying with all regulations. However, again, they will not have access to any personal information about you and will not be able to identify you at any point.

Will I be reimbursed for taking part?

You will not be reimbursed for participating.

What will happen to my data?

Your data will be retained for a period of 18 months, after which it will be deleted from the secure server and removed from Google Forms.

What will happen if I don't want to carry on with the study?

Participation in this research is completely voluntary. Should you wish, you do not have to give any reason for withdrawing from this study. However, any answers you had given up until this point will be used in analysis, unless you explicitly ask for this not to occur.

What if there is a problem?

If you have a concern about any aspect of this study, please speak with research team at the details provided. They will do their best to answer your questions.

If you wish to complain about any aspect of the way in which you have been approached or treated, or how your information is handled during the course of this study, you should contact Meredith Leston (meredith.leston@phc.ox.ac.uk; +447896980320) or you may contact the Research Governance, Ethics & Assurance (RGEA) Office on 01865 616480 or, for the RGEA Team lead, email rgea.complaints@admin.ox.ac.uk

How have patients and the public been involved in this study?

This work has the oversight of the European Alliance of Associations for Rheumatology (EULAR) People with Arthritis/Rheumatism across Europe (PARE). A patient research expert from this organisation sits on the steering committee of this study; her role is to ensure that he questions you are being presented with are of maximal value to patients, clinicians and their caretakers and that findings are disseminated to these groups in an accessible manner.

Who is organising and funding the study?

The study is organised by Ms Meredith Leston from the Nuffield Department of Primary Care Health Sciences at the University of Oxford. This research is funded by EMIS Health and the Medical Research Council.

Thank you for taking part in this research.

Study Background:

The term immunosuppression is generally accepted as referring to those who, either due to a specific diagnosis, procedure, or course of medication, mount an insufficient immune response to infection and onward disease. This term is sometimes used synonymously with immunodeficient or immunocompromised, sometimes as a standalone.

Indeed, there remains considerable disagreement over the exact conditions that confer immunosuppressed status and how this patient spectrum might be meaningfully subdivided or risk categorised. These inconsistencies are most apparent when comparing international clinical guidelines. For example, the definition offered for immunosuppression by *Immunisation against infectious disease: The Green Book* in the United Kingdom is markedly different in scope and conditionality than equivalent national handbooks. Even very subtle differences in definitions can have significant impacts on population sizing: depending on criteria used, the immunosuppressed patient spectrum can constitute anywhere between 2% to 10% of the general population. Inconsistency here fragments the research, disease surveillance and health policy landscape as findings from discordant populations cannot be easily compiled, compared, or actioned. This confusion undermines stated ambitions for targeted patient care.

The COVID-19 pandemic, an ongoing event from the perspective of the clinically vulnerable, typifies these issues and provides a unique opportunity for improvement. Despite collective motivation to protect immunosuppressed patients, conflicting clinical definitions have created international rifts in how these patients have been monitored and managed. That said, thanks to unprecedented levels of collaboration and community testing, there has been a proliferation in literature reporting immunosuppressed health outcomes. Indeed, COVID data provides a much-needed common denominator for establishing differential vulnerability in this diverse clinical risk group. Even rare and complex immunosuppressed conditions have been centred in COVID infection and vaccine research. This is a departure from the previous convention of aggregating immunosuppressed outcomes or selectively reporting those from dominant subgroups.

The DESTINIES Study seeks to respond to these developments, convening over 70 world-leading clinical, research or policy experts in immunology and/or clinical risk prioritisation to define immunosuppression in adults and respond to the current evidence base for differential vulnerability to COVID-19 amongst these patients. This study will appraise all conditions currently associated with immunosuppression, identifying key omissions and redundancies in national definitions to produce an internationally aligned alternative. A series of consensus statements and COVID risk ranking exercises will inform how this can be risk stratified going forwards. A final discussion group will refine these outputs before they are codified into a digital phenotype for onward use in real world surveillance dataflows.

Although COVID-specific, the international definition and risk-stratification that will emerge over the course of this study have significant prospective value for clinical decision-making across all diseases that disproportionately affect the immunosuppressed.

Executive Summary I: ***'Disparities in COVID-19 mortality amongst the immunosuppressed: A systematic review and meta-analysis for enhanced disease surveillance'***

This systematic review and meta-analysis assessed whether excess COVID-19 mortality compared to the immunocompetent could successfully subdivide the immunosuppressed patient spectrum. To do so, authors converted all immunosuppressed terminology included within UK *Immunisation against infectious disease: The Green Book* into search terms compatible with OVID (EMBASE, MEDLINE, Transplant Library and Global Health), PubMed and Google Scholar databases. This characterisation of the immunosuppressed was chosen because of its influence over vaccine prioritisation in the UK and, as a medication- and condition-inclusive definition, the expansive but differentiable entry point it provided into the immunosuppressed literature. This syntax was combined with COVID-19 and mortality terms before being entered into the databases specified.

Literature was screened in two phases of stringency: the first to establish the feasibility of meta-analysis and the second to extract the necessary information to carry it out. Inclusion and exclusion criteria for both phases are specified in Textbox 1.

Textbox 1: Inclusion and Exclusion Criteria

Phase 1:

Inclusion criteria were as follows:

- Study investigated the impact of COVID-19 on at least one immunosuppressed subgroup
- (as defined by the UK guidance); pre-prints were permissible
- COVID-19 associated mortality data was provided in some form on an immunosuppressed
- subgroup basis.

Exclusion criteria were as follows:

- Study did not investigate the impact of COVID-19 on at least one immunosuppressed
- subgroup (as defined by UK guidance); studies that only assessed this at the aggregate
- level of "the immunosuppressed' were also ineligible
- Mortality data was not provided in any form
- Study only presented indirect COVID-19 mortality data - that created by disruptions to
- diagnosis or treatment seen over the course of the pandemic
- Sample size for either immunosuppressed or immunocompetent groups were less than 50
- people
- Multiple or overlapping risk groups were assessed (e.g. pregnant/diabetic
- immunosuppressed patients)
- Immunosuppressants were studied as a prospective treatment for COVID-19, not as a risk
- factor for adverse outcomes
- Study included paediatric patients (under 18 years)
- Study only presented case series (n<50) or single-centre data.

Phase 2:

As per Phase 1, and

Additional inclusion criteria:

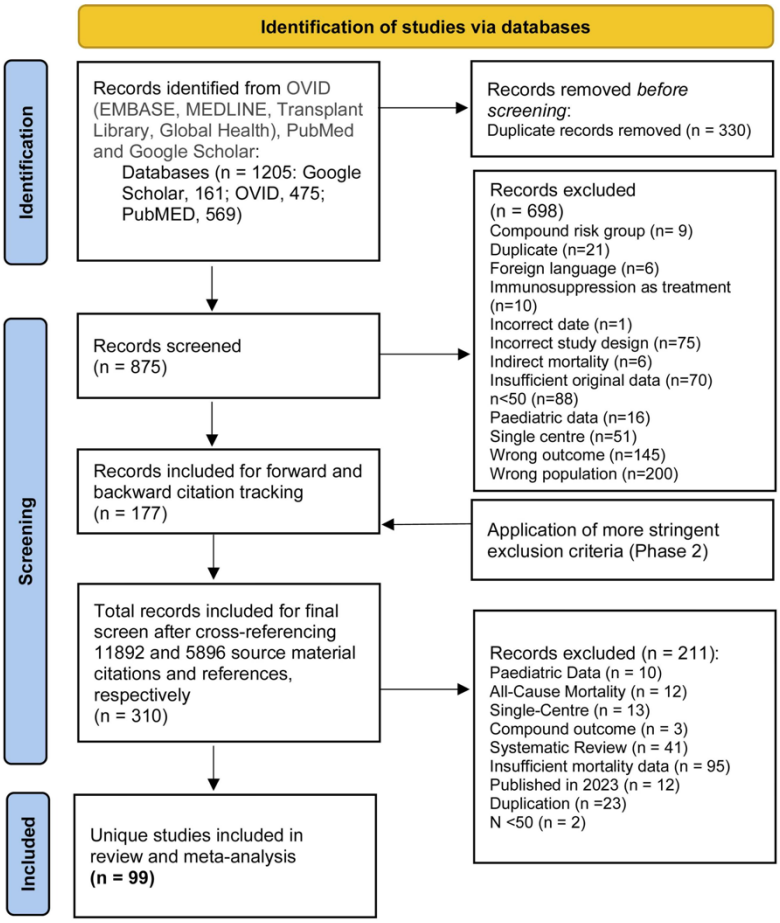
- Mortality data was sufficiently detailed for meta-analysis: studies reported mortality for
- both the relevant immunosuppressed subgroup and their immunocompetent control either
- through a combination of sample size and proportion death or via comparative effect
- measures and their respective confidence intervals.

Additional exclusion criteria:

- Study was published in 2023
- Study used established population-level mortality statistics in lieu of a formal control
- group
- Study only reported compound critical outcomes (e.g. ICU and death)
- Study only reported all-cause mortality
- Study presented a combined estimate of excess mortality via meta-analysis
- Study did not present its own mortality data but summarised other authors' findings.

Figure 1 illustrates the entire screening process. As seen, source material was forward and backwards citation tracked to maximise catchment; papers published in and after 2023 were excluded to minimise the influence of novel therapeutics and vaccines. Once complete, screening returned 99 unique studies that offered data on both immunosuppressed and immunocompetent control mortality outcomes via effect size or absolute case and mortality figures. 18 studies offered mortality data for multiple types of immunosuppressed patients.

Figure 1: Study selection flow diagram



Study screening, extraction and bias assessment were performed blinded and independently by two researchers; conflicts were resolved with the oversight of a third. Information extracted included: title, author(s), publication year, income level (classified by World Bank as 'higher' for high-income countries and 'lower' for low, lower-middle, and upper-middle income), immunosuppression type, case type (All Cases or Hospitalised Cases), time to mortality as well as average age, sample size, number of deaths and/or comparative effect measure type, value, confidence interval (CI) and p-value for both immunosuppressed and immunocompetent cohorts. Odds ratios were imputed where necessary. Overall, data from 1,542,097 immunosuppressed patients and 56,248,181 immunocompetent comparators were analysed.

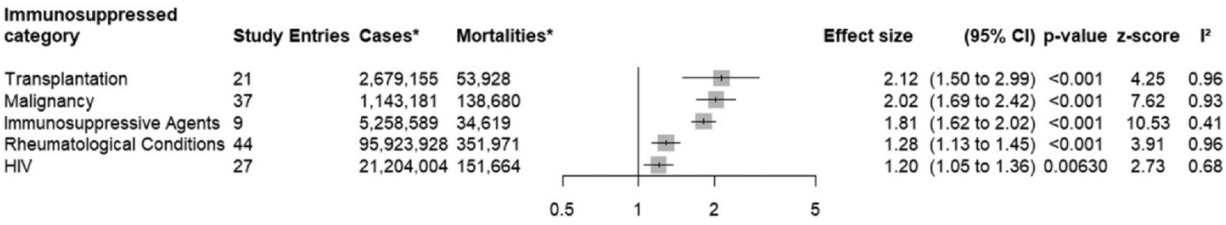
Odds Ratios (OR) and 95% confidence intervals (CI) of COVID-19 mortality were meta-analysed by immunosuppressed category and subcategory, specified in Table 1 below. The weighted average of these odds ratios denoted the pooled intervention effect (Effect size) of the specific form of immunosuppression over COVID-19 mortality. Subgroup analyses differentiated these estimates by effect measure, country income, case type, level of adjustment, use of matching and publication year. Meta regressions for average participant age were also run to establish whether excess mortality risk amongst immunosuppressed COVID patients was constant across the lifespan.

Table 1: Immunosuppressed categories and their constituent subcategories

Immunosuppressed categories	Immunosuppressed subcategories
Transplantation	Mixed transplant cohort *(study cohort included outcomes amongst both solid and stem cell/bone marrow transplant recipients)* Kidney transplant cohort Liver transplant cohort Lung/Heart transplant cohort
Malignancy	Mixed cancer cohort *(study cohort included outcomes amongst both solid tumour and haematological cancer patients)* Haematological cancers Solid tumours
Immunosuppressive agents	Mixed immunosuppressive cohort (*study cohort included outcomes amongst multiple immunosuppressive types)* Biologics Systemic steroids Cancer treatments *(Chemotherapy and radiotherapy)*
Rheumatological conditions	Generalised conditions *(general autoimmune disease, general inflammatory conditions, SLE* etc.*)* Conditions affecting the gut *(Irritable Bowel, Ulcerative Colitis, Crohn's disease* etc.*)* Conditions affecting the joints *(Rheumatoid arthritis* etc.*)* Conditions affecting the skin *(Psoriasis* etc.*)*
HIV	HIV/AIDS *(any stage)*

Figure 2 presents the results of meta-analysis run at the immunosuppressed category level as a summary forest plot. Our findings suggested that compared to the immunocompetent, transplantation recipients, malignancy patients and recipients of immunosuppressive agents had greater COVID-19 mortality risk than rheumatological or HIV patients. Within-category heterogeneity was substantial.

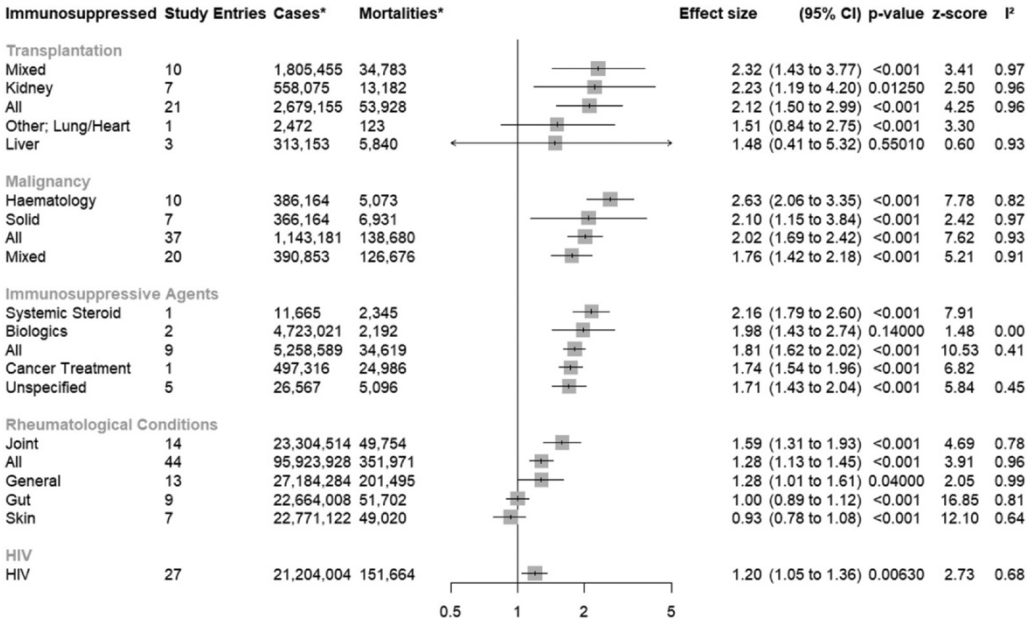
Figure 2: Excess COVID-19 associated mortality by immunosuppressed category



*The column labelled as Cases indicates the total number of participants, immunosuppressed and immunocompetent combined. The column labelled as Mortalities indicates the total number of deaths registered in participants, immunosuppressed and immunocompetent combined. Instances of multiple counts were not removed.

Figure 3 presents the results of meta-analysis run at the immunosuppressed subcategory level as a summary forest plot. This demonstrates the influence of certain subcategories over category estimates of excess mortality.

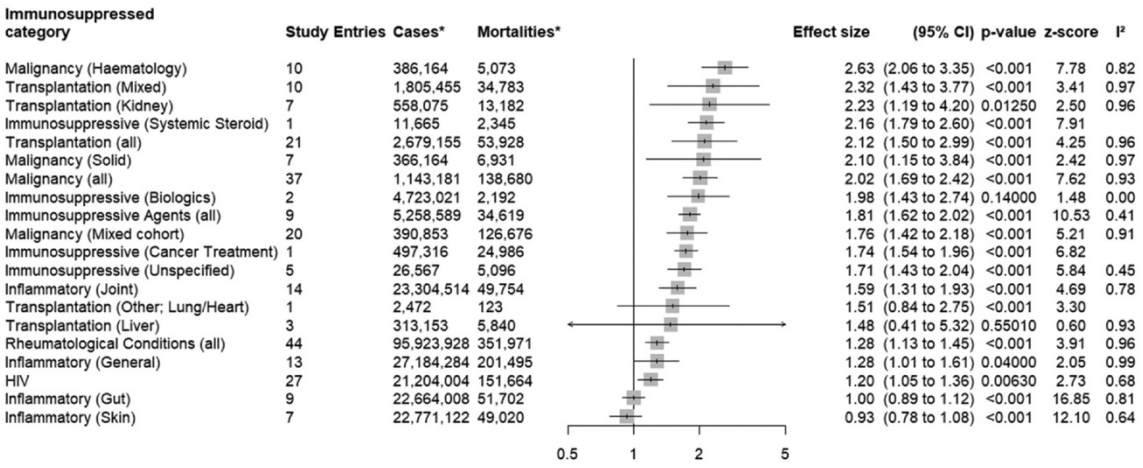
Figure 3: Excess COVID-19 associated mortality by immunosuppressed subcategory



*The column labelled as Cases indicates the total number of participants, immunosuppressed and immunocompetent combined. The column labelled as Mortalities indicates the total number of deaths registered in participants, immunosuppressed and immunocompetent combined. Instances of multiple counts were not removed.

The elevated vulnerability of haematological malignancy patients, systemic steroid recipients and joint-related rheumatological conditions likely pulled category estimates upwards. Meanwhile, the resilience of skin-related rheumatological conditions as well as the single study estimates of cancer treatments and liver and heart/ other transplantations likely pulled category estimates downwards. Figure 4 highlights these relationships by presenting category and subcategory data in descending order of effect size.

Figure 4: Excess COVID-19 associated mortality by immunosuppressed category and subcategory in descending order of effect size.



*The column labelled as Cases indicates the total number of participants, immunosuppressed and immunocompetent combined. The column labelled as Mortalities indicates the total number of deaths registered in participants, immunosuppressed and immunocompetent combined. Instances of multiple counts were not removed.

As illustrated in Table 2, subgroup analyses revealed that case type, study income level, level of adjustment (age, sex, comorbidity at a minimum), use of matching and publication year affected estimates for excess COVID-19 mortality compared to the immunocompetent.

Table 2: Subgroup analyses of excess COVID-19 mortality by immunosuppressed category

Immunosuppression		Number of study entries	Effect size	(95% CI)	I^2	p-value	
Subgroup analyses by country income							
Transplantation	Higher	20	2.13	(1.48-3.04)	96.3%	0.82	
	Lower	1	1.90	(0.76-4.73)	-		
Malignancy	Higher	30	1.82	(1.49-2.21)	87.6%	0.007	
	Lower	7	2.96	(2.17-4.05)	97.2%		
Immunosuppressive agents	Higher	9	1.81	(1.62-2.02)	41.2%	NA	
	Lower	0	-	-	-		
Rheumatological conditions	Higher	42	1.27	(1.11-1.44)	96.3%	< 0.001	
	Lower	2	1.74	(1.57-1.93)	0%		
HIV	Higher	24	1.13	(1.00-1.28)	57.0%	0.001	
	Lower	3	1.78	(1.39-2.28)	43.6%		
Subgroup analysis by COVID-19 case type							
Transplantation	All cases	10	3.36	(1.95-5.78)	95.6%	0.003	
	Hospitalised cases	11	1.37	(1.05-1.77)	79.6%		
Malignancy	All cases	15	2.21	(1.49-2.97)	91.1%	0.76	
	Hospitalised cases	22	1.98	(1.61-2.43)	93.6%		
Immunosuppressive agents	All cases	3	1.63	(1.22-2.17)	46.0%	0.38	
	Hospitalised cases	6	1.88	(1.63-2.18)	47.8%		
Rheumatological conditions	All cases	35	1.31	(1.14-1.51)	96.9%	0.50	
	Hospitalised cases	9	1.18	(0.9-1.55)	87.9%		
HIV	All cases	10	1.32	(1.05-1.65)	80.1%	0.22	
	Hospitalised cases	17	1.11	(0.96-1.29)	43.7%		
Subgroup analysis by level of confounder adjustment							
Transplantation	Yes	15	1.68	(1.25-2.25)	95.7%	0.0758	
	No	6	3.72	(1.63-8.5)	95.2%		
Malignancy	Yes	19	1.95	(1.49-2.55)	94.2%	0.6992	
	No	18	2.1	(1.7-2.7)	90.1%		
Immunosuppressive agents	Yes	9	1.81	(1.62-2.02)	41.2%	NA	
	No	0	-	-	-		
Rheumatological conditions	Yes	33	1.23	(1.09-1.39)	84.7%	0.4	
	No	11	1.43	(1.03-1.99)	94.5%		
HIV	Yes	14	1.35	(1.12-1.62)	73.4%	0.05	
	No	13	1.06	(0.92-1.22)	53.9%		
Subgroup analysis by matching of immunocompetent and immunocompromised							
Transplantation	Matched	12	1.36	(1.04-1.79)	72.2%		0.0017
	Unmatched	9	3.55	(2.09-6.04)	95.9%		
Malignancy	Matched	9	1.69	(1.34-2.13)	70.7%		0.1664
	Unmatched	28	2.13	(1.7-2.66)	93.8%		
Immunosuppressive agents	Matched	2	0.97	(0.52-1.84)	0.0%		0.05
	Unmatched	7	1.85	(1.65-2.06)	38.7%		
Rheumatological conditions	Matched	18	1.18	(0.99-1.41)	74.3%		0.28
	Unmatched	26	1.35	(1.14-1.6)	97.6%		
HIV	Matched	7	1.06	(0.79-1.42)	48.3%		0.32
	Unmatched	20	1.24	(1.09-1.43)	66.3%		
Subgroup analysis by publication year							
Transplantation	2020	6	1.44	(0.84-2.50)	89.5%		0.31
	2021	6	2.27	(1.60-3.21)	92.5%		
	2022	9	2.58	(1.31-5.05)	97.4%		
Malignancy	2020	15	1.68	(1.36-2.07)	82.9%		0.03
	2021	15	1.97	(1.45-2.67)	91.8%		
	2022	7	3.05	(2.02-4.61)	91.9%		
Immunosuppressive agents	2020	0	-	-	-		
	2021	8	1.82	(1.62-2.03)	48.2%		0.74
	2022	1	1.44	(0.38-5.52)	-		
Rheumatological conditions	2020	0	-	-	-		-
	2021	0	-	-	-		
	2022	44	1.28	(1.13-1.45)	0%		
HIV	2020	4	1.12	(0.83-1.51)	0%		
	2021	13	1.24	(1.04-1.48)	76.0%		0.81
	2022	10	1.14	(0.86-1.51)	61.5%		

Effect sizes are generally lower in studies that only included hospitalised patients, were conducted in higher income countries, and analysed matched or adjusted data.

Encouragingly, all findings presented here are in broad agreement with preliminary reports of differential COVID-19 outcomes made by the Investigation oFcOvid-19 Risk amongst iMmunocompromised populations (INFORM) study – elaborated upon within these pre-read materials. To the best of authors' knowledge, however, this work is the first to appraise the immunosuppressed COVID-19 literature comprehensively and comparatively. It has generated insights that are highly informative for disease surveillance. Indeed, the risk

gradient in excess COVID-19 mortality observed may prove beneficial for allocating scarce medical resources such as booster vaccine doses, antivirals, monoclonal antibodies, and convalescent plasma. The priority now is to translate these findings into a definitive COVID-19 risk hierarchy or binary via clinical consensus building.

Executive Summary II: *'Impact of COVID-19 on immunocompromised populations during the Omicron era: insights from the observational population-based INFORM study'*

Even as COVID-19 transitions from a pandemic to an endemic health threat, this disease continues to pose a significant risk to immunocompromised patients. Indeed, recent study of a large US health claims database estimated that as much as 23.5% of immunocompromised patients experienced a COVID-19 related hospitalisation. The protection offered against severe illness by COVID-19 vaccination is inconsistent in this diverse patient group; additional preventative methods, including ongoing isolation or social distancing, may be required amongst some.

The INFORM study was developed to characterise the continued risk of severe COVID-19 outcomes amongst the immunosuppressed and to identify the specific subgroups that may benefit from enhanced medical support. Using routinely collected healthcare record data from a random sample of 25% of the total English population over the age of 12 years, this work collected information on COVID vaccine status, COVID-related prescribing, and COVID-associated health outcomes (hospitalisation, ICU admission and mortality) for the entirety of 2022. Baseline demographic information (age, sex, number of non-immunocompromising comorbidities associated with increased risk of severe COVID-19 outcomes, BMI and IMD) was also described for all populations assessed. Sources included General Practice Extraction Service Data for Pandemic Planning and Research (GDPPR), COVID-19 Second Generation Surveillance System (SGSS), COVID-19 vaccination status data, Hospital Episode Statistics (HES), NHS Business Service Authority (BSA) dispensing data, Office of National Statistics (ONS) data and Personal Demographics Service (PDS) data.

The immunocompromised cohort was classified into the categories listed.

1. Broadly defined immunocompromised, including any individual diagnosed or receiving one or more of the following:
    a. Primary immunodeficiency ≤5 years prior to 1 January 2022. Secondary immunodeficiency
    b. Immunosuppressive therapy [ies] ≤12 months prior to 1 January 2022. High-dose or long-term moderate dose corticosteroids, chronic immune-mediated inflammatory diseases who received high-dose corticosteroids (≥20 mg prednisolone per day) for >10 days in the month prior to 1 January 2022; or chronic immune- mediated inflammatory disease who received long- term moderate dose corticosteroids (10 mg prednisolone per day for >4weeks) ≤3 months prior to 1 January 2022; or high-dose steroids (>40 mg prednisolone per day for >1 week) for any reason in the month prior to 1 January 2022.
    c. End-stage kidney disease (ESKD) ESKD ≤5 years prior to 1 January 2022.
    d. Solid or islet organ transplant (not including corneal transplants) prior to 1 January 2022.
    e. Stem cell transplants: haematopoietic stem cell transplants 2 years prior to 1 January 2022.
    f. Solid tumour: solid tumour [s] ≤5 years prior to 1 January 2022.
    g. Haematological malignancy: haematological malignancy [ies] ≤5 years prior to 1 January 2022.
    h. Advanced or untreated human immunodeficiency virus (HIV): clinical manifestations of symptomatic HIV (i.e., diagnostic code for HIV/acquired

immunodeficiency syndrome (AIDS) or AIDS-defining conditions) ≤12 months prior to 1 January 2022. As CD4 counts were not available in the data, only patients with AIDS-defining illness were captured.

2. Stringently defined immunocompromised, a subset of the above including any individual diagnosed or receiving one or more of the following:
    a. Moderate to severe primary immunodeficiency: common variable immunodeficiency disease, severe combined immunodeficiency, DiGeorge syndrome, or Wiskott-Aldrich syndrome ≤5 years prior to 1 January 2022.
    b. Active treatment with non-corticosteroid immuno- suppressive or immunomodulatory therapy: treatment with alkylating agents, antimetabolites, transplant-related immunosuppressive drugs, cancer chemotherapeutic agents classified as severely immunosuppressive, TNF blockers, and other bio- logic agents that are immunosuppressive or immunomodulatory (e.g., B-cell depleting agents) ≤12 months prior to 1 January 2022.
    c. High-dose corticosteroids: treatment with high-dose corticosteroids steroids (i.e., ≥20 mg prednisone or equivalent per day when administered ≥2 weeks) in the month prior to 1 January 2022.
    d. Solid organ transplant: solid organ transplant (excluding corneal transplants) or islet transplant ≤2 years prior to 1 January 2022.
    e. Stem cell transplant: haematopoietic stem cell transplant ≤2 years prior to 1 January 2022.
    f. Solid or haematologic malignancy on active treat- ment: solid tumour [s] or haematologic malignancies on treatment ≤6 months prior to 1 January 2022.
    g. Chronic lymphocytic leukaemia, non-Hodgkin's lymphoma, multiple myeloma, acute leukaemia: chronic lymphocytic leukaemia, non-Hodgkin's lymphoma, multiple myeloma, or acute leukaemia ≤2 years prior to 1 January 2022.
    h. Advanced or untreated HIV: same definition as above.

Immunocompromised groups were not mutually exclusive; individuals could contribute date to any group they were eligible. Additional subgroups were also introduced to provide a more granular view of COVID-19 burden in groups known to be at particular risk. For solid tumours and haematological malignancies, analysis was differentiated by recency of treatment ((≤6 months, 6–12 months, and >12 months); for solid organ transplant recipients, analysis was differentiated by recency of transplantation (≤1 year and >1–2 years prior and on anti-rejection therapy). Data was compared with a non-immunocompromised control group.

The study population amounted to 11,990,730 individuals. 470,910 were classified as immunocompromised in some respect (a prevalence of 3.9% broadly defined immunocompromised and 0.7% stringently defined immunocompromised); 11,519,820 were immunocompetent. Baseline characteristics of study groups are presented in Table 1.

Table 1: Baseline characteristics of the study population

Characteristic	Total population	Broadly-defined immunocompromised	Stringently-defined immuncompromised
	N = 11,990,730	N = 470,910	N = 83,185
Age, mean (SD)	45.2 (20.7)	66.1 (16.4)	64.7 (17.0)
Sex (n, %)			
Male	5,953,930 (49.7)	224,860 (47.8)	41,475 (49.9)
Female	6,036,080 (50.3)	246,040 (52.2)	41,710 (50.1)
Ethnicity (n, %)[a]			
White	6,450,440 (53.8)	388,380 (82.5)	69,015 (83.0)
Black	398,490 (3.3)	13,165 (2.8)	2730 (3.3)
South Asian	641,405 (5.3)	18,735 (4.0)	3765 (4.5)
Other	621,110 (5.2)	14,645 (3.1)	2955 (3.6)
Unknown	3,879,283 (32.4)	35,984 (7.6)	4721 (5.7)
Index of Multiple Deprivation± (n, %)			
Most deprived 20%	2,975,810 (24.8)	97,085 (20.6)	17,380 (20.9)
Second most deprived 20%	2,539,420 (21.2)	91,975 (19.5)	16,355 (19.7)
Third most deprived 20%	2,154345 (18.0)	89,250 (19.0)	15,905 (19.1)
Second least deprived 20%	2,100,470 (17.5)	96,765 (20.5)	17,045 (20.5)
Least deprived 20%	1,946,735 (16.2)	94,925 (20.2)	16,400 (19.7)
Body Mass Index, for individuals aged 18+ years			
Mean (SD)[b]	27.1 (6.6)	27.9 (6.2)	27.6 (6.1)
Median (IQR)[c]	26.2 (7.8)	27.1 (7.3)	26.8 (7.3)
Minimum, Maximum	10.0, 90.0	10.0, 90.0	10.0, 89.9
Number of non-immunocompromising comorbidities (n,%)[d]			
0	5,776,290 (48.2)	116,385 (24.7)	19,670 (23.6)
1	3,839,335 (32.0)	148,525 (31.5)	25,785 (31.0)
2	1,597,535 (13.3)	109,950 (23.3)	20,010 (24.1)
≥3	777,565 (6.5)	96,045 (20.4)	17,725 (21.3)
Number of doses of a COVID-19 vaccine (n, %)			
0	2,642,845 (22.0)	23,705 (5.0)	4095 (4.9)
1	830,965 (6.9)	6675 (1.4)	1520 (1.8)
2	2,456,280 (20.5)	42,690 (9.1)	8015 (9.6)
≥3	6,060,635 (50.5)	397,835 (84.5)	69,555 (83.6)
Death during follow-up (n, %)	122,155 (1.0)	33,985 (7.2)	10,025 (12.1)

IQR – interquartile range, SD – standard deviation. [a]Ethnicity distribution in the total population is greatly biased by the large proportion of "Unknown". 2021 Census data for England and Wales point to an ethnicity distribution very similar to that observed in the IC populations: 82% White and 18% Black, Asian, mixed or other subgroup. Source: https://www.ethnicity-facts-figures.service.gov.uk. [b]Patients with missing values excluded from denominator in calculations of summary statistics. [c]IQR between the 25% and 75% percentile of the associated distribution. [d]Comorbidities included diabetes, current or former smoking, Down's syndrome, sickle cell disease, thalassemia, multiple sclerosis, motor neurone disease, myasthenia gravis, Huntington's disease, chronic heart disease, cerebrovascular disease, chronic liver disease, chronic lung disease, pulmonary hypertension, and cystic fibrosis.

As per Table 2 and 3, a total of 20,910 COVID-19 hospitalisations, 440 ICU admissions and 4810 COVID-19 deaths were recorded for the overall study population. Among the immunocompromised, these figures were 6-fold higher for broadly defined individuals and 11-fold higher for stringently defined immunocompromised than the non-immunocompromised comparator group. Incidence rate ratios remained elevated for both categories even after adjusting for age, sex, and the number of non-immunocompromising comorbidities. Among specific immunocompromised subgroups, aIRRs were highest for stem cell transplantation in the last 2 years (14.24, 95% CI 10.15-19.97) and solid organ transplantation (11.6, 95% CI 10.10-13.31). Immunocompromised individuals were disproportionately represented in severe COVID outcome data. Despite comprising just 3.9% of the total study population, broadly defined immunocompromised represented 21.9% of hospitalisations, 28.1% of ICU admissions and 23.8% of deaths; meanwhile, stringently defined immunocompromised (0.7% of the overall population) represented 8% of hospitalisations, 16.5% of ICU admissions and 7.4% of deaths. These values inflated when only looking at recipients of at least 3 vaccine doses.

Table 2: COVID-19 related hospitalisations in the study population

	Overall Population		COVID-19 Hospitalisations[d]							
	N total study population[e]	% of total population[b]	Patients hospitalised[e]	N hospitalisations[e]	% of hospitalisations[b]	Total person-time (years)	Crude IR (per 1000 patient years)	IR 95% CI	Adjusted IRR[c]	IRR 95% CI
Overall study population										
All individuals	11,990,730	100.00	20,600	20,910	100.0	11,987,570	1.7	1.6–1.8		
Total broadly defined immunocompromised	470,910	3.90	4465	4585	21.9	470,055	9.7	9.4–10.0	2.16	2.09–2.24
Total stringently defined immunocompromised	83,185	0.70	1595	1675	8.0	82,860	20.2	19.5–20.9	4.61	4.38–4.85
Primary immunodeficiency	9320	0.08	185	195	0.9	9285	21.0	19.0–23.0	5.54	4.79–6.39
Moderate to severe primary immunodeficiency[a]	1270	0.01	25	30	0.1	1265	22.9	17.4–28.4	9.40	6.48–13.63
Secondary immunodeficiency	89,885	0.70	830	845	4.1	89,760	9.4	8.7–10.1	2.86	2.66–3.07
Active treatment with non-corticosteroid immunosuppressive or immunomodulatory therapy[a]	11,365	0.09	250	255	1.2	11,315	22.7	20.9–24.5	5.50	4.85–6.23
High-dose, long-term moderate-dose corticosteroids	4130	0.03	40	40	0.2	4120	9.7	6.6–12.8	1.90	1.39–2.61
High-dose corticosteroids[a]	3365	0.03	20	20	0.1	3365	6.5	3.1–9.9	1.41	0.92–2.17
End-stage kidney disease	23,315	0.20	580	590	2.8	23,210	25.5	24.2–26.8	3.83	3.52–4.16
Solid organ transplant ≤5 years prior	7375	0.06	215	215	1.0	7345	29.1	26.8–31.4	11.60	10.10–13.31
≤1 year prior[a]	2705	0.02	75	75	0.4	2695	28.2	24.4–32.0	11.37	9.03–14.31
1–2 years prior[a]	1540	0.01	45	45	0.2	1530	28.1	23.1–33.1	11.62	8.56–15.77
On anti-rejection therapies[a]	2640	0.02	85	85	0.4	2630	32.0	28.2–35.8	12.05	9.68–15.00
Stem cell transplant ≤2 years prior[a]	1435	0.01	35	35	0.2	1430	24.5	19.3–29.7	14.24	10.15–19.97
Solid tumour ≤5 years prior	309,395	2.60	2380	2415	11.5	308,890	7.8	7.4–8.2	1.41	1.35–1.47
With active treatment (≤6 months prior)[a]	27,700	0.20	420	430	2.0	27,610	15.5	14.3–16.7	3.66	3.31–4.03
With recent treatment (6–12 months prior)	6985	0.06	75	75	0.4	6965	11.1	8.7–13.5	2.57	2.04–3.23
With distant treatment (>12 months prior)	36,480	0.30	200	205	1.0	36,445	5.6	4.6–6.6	1.26	1.10–1.45
Haematological malignancy ≤5 years prior	60 270	0.50	1075	1145	5.5	60,035	19.1	18.3–19.9	3.58	3.36–3.80
With active treatment (≤6 months prior)[a]	8420	0.07	380	420	2.0	8330	50.3	48.2–52.4	10.69	9.68–11.80
With recent treatment (6–12 months prior)	2250	0.02	60	70	0.3	2240	31.2	27.1–35.3	6.60	5.20–8.39
With distant treatment (>12 months prior)	11,990	0.10	160	165	0.8	11,955	14.0	12.2–15.8	2.87	2.45–3.35
Chronic lymphocytic leukaemia, non-Hodgkin's lymphoma, multiple myeloma, acute leukaemia (≤2 years prior)[a]	35,720	0.30	855	925	4.4	35,525	26.1	25.1–27.1	4.84	4.52–5.18
Advanced or untreated HIV[a]	580	0.01	<10	<10	<0.05	575	13.9	5.7–22.1	2.26	1.11–4.58
Vaccinated population (≥3 doses of a COVID-19 vaccine)										
All individuals	6,060,635	100.00	14,365	14,600	100.0	6,058,430	2.4	2.3–2.5		
Total broadly defined immunocompromised	397,835	6.60	3525	3625	24.8	397,190	9.1	8.8–9.4	2.17	2.09–2.26
Total stringently defined immunocompromised	69,560	1.10	1265	1335	9.2	69,295	19.3	18.6–20.0	4.71	4.44–4.99
Primary immunodeficiency	6605	0.10	145	155	1.1	6580	23.6	21.2–26.0	5.81	4.94–6.83
Moderate to severe primary immunodeficiency[a]	870	0.01	20	20	0.2	870	25.3	18.7–31.9	9.70	6.33–14.87
Secondary immunodeficiency	75,465	1.20	670	685	4.7	75,365	9.1	8.4–9.8	3.02	2.79–3.27
Active treatment with non-corticosteroid immunosuppressive or immunomodulatory therapy[a]	9370	0.20	190	200	1.4	9335	21.4	19.4–23.4	5.54	4.81–6.39
High-dose, long-term moderate dose corticosteroids	3510	0.06	35	35	0.2	3505	10.0	6.7–13.3	2.16	1.54–3.02
High-dose corticosteroids[a]	2770	0.05	20	20	0.1	2770	7.6	3.9–11.3	1.75	1.13–2.71

	Overall Population		COVID-19 Hospitalisations[d]							
	N total study population[e]	% of total population[b]	Patients hospitalised[e]	N hospitalisations[e]	% of hospitalisations[b]	Total person-time (years)	Crude IR (per 1000 patient years)	IR 95% CI	Adjusted IRR[c]	IRR 95% CI
End-stage kidney disease	18,055	0.30	420	430	2.9	17,980	23.9	22.4–25.4	3.74	3.39–4.13
Solid organ transplant ≤5 years prior	5765	0.10	170	170	1.2	5740	29.8	27.2–32.4	13.12	11.23–15.31
≤1 year prior[a]	2065	0.03	55	55	0.4	2055	26.3	22.0–30.6	11.77	8.96–15.47
1–2 years prior[a]	1200	0.02	35	35	0.2	1195	28.4	22.7–34.1	12.95	9.18–18.26
On anti-rejection therapies[a]	2075	0.03	60	60	0.4	2065	28.1	23.8–32.4	11.72	9.01–15.26
Stem cell transplant ≤2 years prior[a]	995	0.02	20	20	0.1	995	18.1	11.9–24.3	10.96	6.83–17.56
Solid tumour ≤5 years prior	265,960	4.40	1890	1915	13.1	265,600	7.2	6.8–7.6	1.40	1.33–1.47
With active treatment (≤6 months prior)[a]	23,475	0.40	325	335	2.3	23,410	14.3	13.0–15.6	3.65	3.26–4.08
With recent treatment (6–12 months prior)	5960	0.10	50	50	0.4	5945	8.7	6.2–11.2	2.23	1.69–2.95
With distant treatment (>12 months prior)	31,305	0.50	165	170	1.2	31,275	5.5	4.4–6.6	1.33	1.14–1.55
Haematological malignancy ≤5 years prior	50,665	0.80	865	925	6.3	50,470	18.4	17.5–19.3	3.62	3.38–3.87
With active treatment (≤6 months prior)[a]	6960	0.10	290	325	2.2	6895	47.1	44.7–49.5	10.63	9.50–11.89
With recent treatment (6–12 months prior)	1875	0.03	45	50	0.3	1865	25.7	21.2–30.2	5.80	4.34–7.74
With distant treatment (>12 months prior)	10,165	0.20	135	140	1.0	10,135	13.9	12.0–15.8	3.03	2.55–3.59
Chronic lymphocytic leukaemia, non-Hodgkin's lymphoma, multiple myeloma, acute leukaemia (≤2 years prior)[a]	30,295	0.50	695	755	5.2	30,135	25.1	24.0–26.2	4.96	4.60–5.35
Advanced or untreated HIV[a]	455	0.007	<10	<10	<0.07	450	15.5	6.3–24.7	2.55	1.20–5.43

CI – confidence interval. IR – incidence rate per 1000 person-years. IRR – incidence rate ratio. [a]Stringent immunocompromised subgroups. [b]Percentages are based on the total number individuals or COVID-19 events in the overall 12+ population. [c]Incidence rate ratios (IRR) adjusted for age, sex, and number of non-immunocompromising comorbidities, comparing the incidence rate of individuals with the condition specified in each row to the incidence rate in individuals who do not have the condition specified in that row. [d]Any overnight hospital stay with COVID-19 recorded as the primary diagnosis; for IRR calculations, hospital readmission within one week of discharge is not considered a new hospitalisation. [e]Counts are rounded to the nearest 5 in compliance with the NHS Privacy Policy.

Table 3: COVID-19 related ICU admissions and mortality in the study population

	COVID-19 ICU							COVID-related mortality						
	N ICU[a,d]	% of ICU[b]	Total person-time (years)	Crude IR	IR 95% CI	Adjusted IRR[c]	IRR 95% CI	N deaths[a]	% of deaths[b]	Total person-time (years)	Crude IR	IR 95% CI	Adjusted IRR[c]	IRR 95% CI
Overall study population														
All individuals	440	100.0	11,990,553	0.04	0.0–0.09			4810	100.0	11,930,335	0.4	0.3–0.5		
Total broadly defined immunocompromised	125	28.1	470,844	0.3	0.0–0.6	4.13	3.30–5.18	1145	23.8	452,710	2.5	2.2–2.8	1.97	1.84–2.11
Total stringently defined immunocompromised	75	16.5	83,144	0.9	0.2–1.6	12.48	9.60–16.22	355	7.4	77,810	4.6	3.9–5.3	3.99	3.58–4.46
Primary immunodeficiency	<10	<2.2	9315	1.0	0.0–3.0	13.29	6.76–26.14	45	1.0	9070	5.1	3.0–7.2	5.66	4.20–7.61
Moderate to severe primary immunodeficiency[e]	0	0.0	1270	NA	NA	NA	NA	<10	<0.2	1245	4.0	0.0–9.5	8.30	3.39–20.32
Secondary immunodeficiency	25	5.7	8969	0.3	0.0–0.9	4.12	2.72–6.24	195	4.0	88,535	2.2	1.5–2.9	2.99	2.58–3.47
Active treatment with non-corticosteroid immunosuppressive or immunomodulatory therapy[e]	15	3.2	11,353	1.2	0.0–3.1	15.03	8.71–25.95	60	1.2	11,020	5.4	3.5–7.3	5.53	4.26–7.19
High-dose, long-term moderate dose corticosteroids	0	0.0	4130	NA	NA	NA	NA	<10	<0.2	3930	2.0	0.–5.1	1.65	0.81–3.34
High-dose corticosteroids[e]	0	0.0	3366	NA	NA	NA	NA	<10	<0.2	3160	1.3	0.0–4.8	1.14	0.42–3.09
End-stage kidney disease	35	8.1	23,297	1.5	0.3–2.8	13.95	9.74–19.97	145	3.1	21,820	6.7	5.4–8.0	3.81	3.22–4.50
Solid organ transplant ≤5 years prior	15	3.2	7364	1.9	0.0–4.2	24.74	14.28–42.85	35	0.7	7220	4.7	2.4–7.0	13.03	9.22–18.41
≤1 year prior[e]	<10	<2.2	2702	2.6	0.0–6.4	33.25	15.44–71.57	10	0.2	2645	4.2	0.4–8.0	12.25	6.69–22.42
1–2 years prior[e]	<10	<2.2	1538	0.7	0.0–5.6	8.48	1.14–62.90	10	0.2	1505	6.6	1.6–11.6	18.74	9.95–35.33
On anti-rejection therapies[e]	<10	<2.2	2635	2.3	0.0–6.1	27.59	12.07–63.05	10	0.2	2595	4.6	0.8–8.4	12.09	6.78–21.58
Stem cell transplant ≤2 years prior[e]	<10	<2.2	1434	1.4	0.0–6.6	24.92	6.03–102.98	<10	<0.2	1390	1.4	0.0–6.6	6.36	1.55–26.18
Solid tumour ≤5 years prior	35	7.9	309,379	0.1	0.0–0.5	1.22	0.85–1.74	625	13.0	295,030	2.1	1.7–2.5	1.30	1.19–1.42
With active treatment (≤6 months prior)[e]	<10	<2.2	27,698	0.2	0.0–1.4	2.42	1.06–5.52	60	1.3	24,405	2.5	1.3–3.7	2.58	2.00–3.33
With recent treatment (6–12 months prior)	<10	<2.2	6985	0.3	0.0–2.6	3.20	0.78–13.23	10	0.2	6400	1.7	0.0–4.1	1.72	0.94–3.14
With distant treatment (>12 months prior)	<10	<2.2	36,479	0.08	0.0–1.1	0.93	0.29–2.98	60	1.2	35,355	1.7	0.6–2.8	1.52	1.17–1.98
Haematological malignancy ≤5 years prior	55	12.7	60,240	0.9	0.1–1.7	12.37	9.23–16.57	300	6.2	57,730	5.2	4.4–6.0	3.32	2.95–3.74
With active treatment (≤6 months prior)[e]	25	5.9	8401	3.2	1.1–5.4	37.94	25.39–56.69	90	1.9	7745	11.9	9.7–14.1	10.12	8.20–12.50
With recent treatment (6–12 months prior)	<10	<2.2	2248	2.2	0.0–6.4	24.92	10.12–61.37	10	0.2	2140	5.6	1.4–9.8	4.64	2.60–8.26
With distant treatment (>12 months prior)	<10	<2.2	11,989	0.5	0.0–2.3	5.70	2.50–12.99	45	0.9	11,615	3.9	2.1–5.7	2.99	2.22–4.04
Chronic lymphocytic leukaemia, non-Hodgkin's lymphoma, multiple myeloma, acute leukaemia (≤2 years prior)[e]	50	11.8	35,691	1.5	0.4–2.5	18.92	14.00–25.58	235	4.9	34,080	6.9	5.8–8.0	4.49	3.93–5.13
Advanced or untreated HIV[e]	0	0.0	578	NA	NA	NA	NA	<10	<0.2	515	5.8	0.0–14.4	3.12	1.13–11.39
Vaccinated population (≥3 doses of a COVID-19 vaccine)														
All individuals	255	100	6,060,529	0.04	0.0–0.1			3425	100.0	6,013,350	0.6	0.5–0.7		
Total broadly defined immunocompromised	90	36.1	397,784	00.2	0–0.5	4.66	3.56–6.11	855	24.9	383,315	2.2	1.9–2.5	1.98	1.83–2.14
Total stringently defined immunocompromised	55	22	69,524	0.08	0.08–1.6	14.34	10.56–19.48	295	8.7	65,260	4.6	3.8–5.4	4.55	4.03–5.14
Primary immunodeficiency	<10	<3.9	6601	1.4	0–3.8	20.43	10.33–40.41	35	1.1	6410	5.6	3.2–8.0	6.09	4.35–8.51
Moderate to severe primary immunodeficiency[e]	0	0	872	0		NA	NA	<10	<0.3	855	4.7	0–11.4	9.43	3.47–25.65
Secondary immunodeficiency	20	7.8	75,450	0.3	0–1.0	4.84	3.03–7.72	130	3.9	74,400	1.8	1.1–2.5	2.81	2.35–3.35
Active treatment with non-corticosteroid immunosuppressive or immunomodulatory therapy[e]	10	3.9	9363	1.2	0–3.2	17.49	9.42–32.47	45	1.3	9100	4.9	2.9–6.9	5.72	4.24–7.73
High-dose, long-term moderate dose corticosteroids	0	0	3511	0		NA	NA	<10	<0.3	3365	1.8	0–5.2	1.65	0.73–3.74
High-dose corticosteroids[e]	0	0	2771	0		NA	NA	<10	<0.3	2635	0.8	0–4.7	0.76	0.18–3.12
End-stage kidney disease	25	10.2	18,040	1.4	0–2.9	16.15	10.55–24.74	100	2.9	16,935	6.0	4.5–7.5	3.68	3.00–4.50
Solid organ transplant ≥5 years prior	10	3.9	5759	1.9	0–4.5	20.93	2.82–155.56	30	0.9	5650	5.3	2.7–7.9	17.91	12.38–25.90
≤1 year prior[e]	<10	<3.9	2062	2.9	0–7.2	46.31	20.12–106.68	10	0.3	2020	5.4	1.1–9.7	19.60	10.70–35.92
1–2 years prior[e]	0	0	1200	0		NA	NA	<10	<0.3	1180	5.9	0.2–11.6	19.94	9.35–42.53
On anti-rejection therapies[e]	<10	<3.9	2071	2.4	0–6.7	35.93	14.47–89.25	10	0.3	2045	5.4	1.1–9.7	13.32	4.89–36.27
Stem cell transplant ≤2 years prior[e]	25	9.8	996	0		NA	NA	<10	<0.3	970	1.0	0–7.2	5.16	0.70–38.17
Solid tumour ≤5 years prior	<10	<3.9	265,950	0.09	0–0.5	1.22	0.79–1.86	465	13.6	254,460	1.8	1.4–2.2	1.29	1.17–1.43
With active treatment (≤6 months prior)[e]	<10	<3.9	23,475	0.2	0–1.5	2.85	1.15–7.05	50	1.5	20,840	2.4	1.1–3.7	2.91	2.19–3.86
With recent treatment (6–12 months prior)	<10	<3.9	5958	0.2	0–2.7	2.27	0.31–16.86	<10	<0.3	5505	1.1	0–3.8	1.29	0.57–2.91
With distant treatment (>12 months prior)	40	16.5	31,302	0.03	0–1.1	0.43	0.06–3.20	40	1.2	30,390	1.3	0.2–2.4	1.43	1.04–1.96
Haematological malignancy ≤5 years prior	20	7.1	50,638	0.8	0–1.7	13.58	9.65–19.11	250	7.3	48,570	5.1	4.2–6.0	3.72	3.26–4.25
With active treatment (≤6 months prior)[e]	<10	<3.9	6950	2.7	0.4–5.1	38.33	23.71–61.97	75	2.2	6430	11.5	9.1–13.9	11.26	8.90–14.26
With recent treatment (6–12 months prior)	<10	<3.9	1870	2.1	0–6.7	28.43	10.36–78.02	10	0.3	1780	5.6	1.0–10.2	5.31	2.82–10.00
With distant treatment (>12 months prior)	40	15.3	10,164	0.6	0–2.5	8.00	3.50–18.32	40	1.2	9850	4.1	2.1–6.1	3.59	2.61–4.94
Chronic lymphocytic leukaemia, non-Hodgkin's lymphoma, multiple myeloma, acute leukaemia (≤2 years prior)[e]	0	0	30,269	1.3	0.2–2.4	20.55	14.46–29.20	200	5.9	28,955	6.9	5.8–8.0	5.18	4.48–5.99
Advanced or untreated HIV[e]	25	9.8	454	0		NA	NA	<10	<0.3	405	4.9	0–14.6	2.85	0.69–11.75

CI – confidence interval. IR – incidence rate per 1000 person-years. IRR – incidence rate ratio. NA – not applicable. [a]Counts are rounded to the nearest 5 in compliance with the NHS Privacy Policy. [b]Percentages are based on the total number of events. [c]Incidence rate ratios (IRR) adjusted for age, sex, and number of non-immunocompromising comorbidities, comparing the incidence rate of individuals with the condition specified in each row to the incidence rate in individuals who do not have the condition specified in that row. [d]Number of patients with ≥1 COVID-19 ICU admission. [e]Stringent immunocompromised subgroups.

In sum, this work provides clear evidence for the continued vulnerability of the immunocompromised to COVID-19; these individuals represented over 20% of COVID-related hospitalisations, ICU admissions and mortality despite a 3 dose or greater vaccine uptake of over 80%. Although UK pandemic guidelines prioritised the immunosuppressed during its acute phase, more can be done to better target these guidelines to achieve appropriately risk-prioritised policies and recommendations.

Executive Summary III: *'Immune responses and clinical outcomes following COVID-19 vaccination in patients with immune suppressive diseases (The OCTAVE Study)'*

It is well-established that, globally, vaccines against COVID-19 have saved millions of lives. However, while these vaccines continue to confer high protection against critical outcomes, they do not necessarily prevent infection.

The clinical trials and population studies that have investigated the effectiveness of COVID-19 vaccines are generally focused amongst those without pre-existing conditions. This reveals very little about the vaccine outcomes of those with impaired immune systems – patients that we know face parallel risks of severe COVID-19 outcomes and suboptimal vaccine response.

The **O**bservational **C**ohort trial **T** cells, **A**ntibodies and **V**accine **E**fficacy in SARS-CoV-2 (OCTAVE) study was launched to measure COVID-19 vaccine response in patients with different forms of immunosuppression. 2,686 patients were recruited from 11 participating hospitals across the United Kingdom. This cohort included the following patient types:

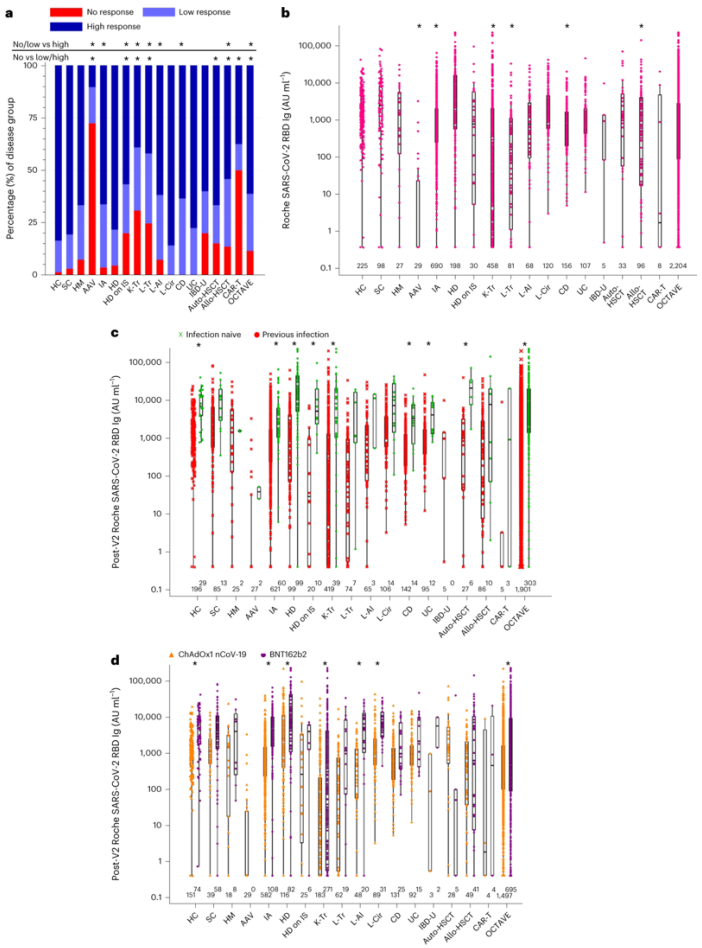
- Immunosuppressive therapy recipients (for solid cancer, haematological malignancy, ANCA-associated vasculitis on rituximab, inflammatory arthritis, autoimmune liver disease, liver and kidney transplantation, inflammatory bowel disease, ulcerative colitis and undefined inflammatory bowel disease)
- Patients receiving autologous and allogenic hematopoietic stem cell transplant (auto-HSCT and allo-HSCT)
- Patients treated with chimeric antigen receptor (CAR) T cells
- Patients with disease states known to modulate immune responses intrinsically (end-stage kidney disease receiving haemodialysis with or without immunosuppression and patients with advanced liver disease)

All patients had received two vaccine doses - vaccinated with mRNA (BNT162b2 or mRNA-1273) or ChAdOx1 nCov-19 according to UK government-recommended scheduling. Vaccine response was evaluated before and after homologous first dose (V1) and second dose (V2) via antibody and T cell proxies. Responses to variants of concern within patient blood and saliva were also monitored. This data was compared to that of age, sex, prior COVID-19 infection, and vaccine matched healthy controls. Uniquely to this study, antibody and T-cell responses were measured in the same location; direct comparisons could therefore be made between patient groups to identify those most vulnerable to vaccine non-response.

Previous infection, identified via the presence of anti-nucleocapsid antibodies at baseline, was identified in 14% of immunosuppressed patients, with significantly higher rates in those receiving haemodialysis (49%). Two-dose vaccine response could only be evaluated in 2,204 patients and 225 matched controls, however. Seropositivity was denoted as anti-receptor-binding domain (RBD) antibody titers of ≥ 0.8 AU ml−1 after the second dose. By this measure, 99% of healthy controls were seropositive versus 88% of immunosuppressed patients – as illustrated in Figure 1. Seroconversion was lowest in ANCA-associated vasculitis patients receiving rituximab; here only 28% of patients successfully seroconverted.

This compares to 50% of CAR-T recipients, 69% of kidney transplant recipients, 75% of liver transplant recipients, 80% of haemodialysis patients, 85% of auto-HSCT recipients and 86% of allo-HSCT recipients. All other immunosuppressed groups under observation returned similar rates of seropositivity to healthy controls; 100% of cirrhosis, Crohn's disease and ulcerative colitis patients seroconverted, for example. In all, 27% of our immunosuppressed cohort generated low levels of antibodies compared to the healthy group of volunteers, and 12% of patients (around 1 in 10 patients) failed to develop any measurable COVID-19 antibodies at all. Likewise, 12% of immunosuppressed patients failed to generate T-cells against COVID-19; lowest T cell response was observed in patients with kidney disease and liver and kidney transplant recipients.

Figure 1: Anti-SARS-CoV-2 RBD total Ig responses in whole OCTAVE cohort at post V2 timepoint



a, Proportion of group 1 and group 2 non (<0.8 AU ml−1), low (<380 AU ml−1) and high (>380 AU ml−1) anti-SARS-CoV-2 spike RBD total Ig responses. Statistical comparisons of the proportion of low and no versus high response and no versus low and high response in disease groups compared to healthy controls are presented. **b,** Magnitude of serological response in disease groups and healthy controls. Statistical comparisons comparing disease group to healthy controls are presented. **c,** Anti-SARS-CoV-2 spike RBD total Ig responses comparing previously infected with infection-naive patents. Statistical comparison of infection-naive individuals and previously infected individuals within each group is presented. **d,** Anti-SARS-CoV-2 spike RBD total Ig responses separated by vaccine type. Statistical comparison of vaccine type in each disease group is presented. Unpaired statistical comparison was made on all groups using a two-sided Kruskal–Wallis with post hoc Dunn's testing. Comparisons of proportions were performed using $\chi 2$ or Fisher's exact tests adjusted for significance using Bonferroni correction (adjusted alpha = 0.003). Only significant comparisons are presented. * indicates statistically significant by Bonferroni-adjusted alpha. Boxes represent median and IQR; whiskers represent ±1.5× IQR.AAV, ANCA-associated vasculitis; CD, Crohn's disease; HC, healthy controls; HD, hemodialysis; HD on IS, hemodialysis on immunosuppression; HM, hemotological malignancy; IA, inflammatory arthritis; L-AI, autoimmune hepatitis; L-Cir, liver cirrhosis; L-Tr, liver transplant; SC, solid cancer; UC, ulcerative colitis.

When assessing the cross-reactivity of SARS-CoV-2 spike ancestral antibody responses to various variants of concern (Alpha [B.1.1.7], Beta [B.1.351], Gamma [P.1], Delta [B.1.617.2] and Omicron [B.1.1.529 and BA.1]), median spike IgG and spike-ACE-2 binding was significantly decreased to all variants except Alpha in all immunosuppressed groups assessed (liver transplant, autoimmune liver disease, cirrhosis, inflammatory arthritis cohorts). This was most apparent for the Omicron BA.1 variant, though previously infected patients were better able to neutralise. When comparing vaccines, mRNA recipients demonstrated higher antibody but lower T cell responses compared to ChAdOx1 nCov-19 counterparts.

Over the course of the study, 474 patients became infected with COVID-19; of these, 33 were admitted to hospital and 15 died. There was a higher rate of infection amongst patients with absent serological or T cell responses compared to those with high levels of response.

Overall, the OCTAVE study identifies patient groups that exhibit impaired response to COVID-19 vaccines. Failure to seroconvert is also linked to severe disease in this work. That said, it is reassuring that the majority of immunosuppressed patients generate robust immune responses to vaccination, at least proxied by antibody production and T-cell activity. The priority now is to ensure that those identified as being at greatest risk for poor seroconversion are appropriately prioritised for booster doses and alternative therapeutic strategies.

Executive Summary IV: *'Consensus position statement on advancing the standardised reporting of infection events in immunocompromised patients'*

The immunocompromised research landscape is rife with inconsistency, especially in respect to reporting on their disease outcomes. Different approaches to detecting, diagnosing, classifying, and dismissing infection events have led to significant interstudy heterogeneity. Even with the introduction of standardised reporting tools and regular data audits, largescale research efforts in immunocompromised infectivity have still failed to document the aetiology and causative pathogen in 40-60% of infection-related deaths. Poor categorisation and limited codification of immunocompromised infection events have also undermined researcher ability to pool or differentiate what data is available. This has knock on implications for directing patient care or public policy.

This effort was designed to identify workable middle ground between an idealised set of immunocompromised infection reporting criteria and that which would be both feasible and convenient for researchers to adopt in a busy clinical or study environment. A study group of experts in infection outcomes in the immunocompromised convened in Lisbon, Portugal (during the European Congress of Clinical Microbiology and Infectious Diseases 2022) to discuss these issues, conduct a literature search for existing reporting guidelines and identify the core minimum reporting items that could harmonise these offerings. Study group members were affiliated with a number of global immunosuppressed societies – all of which ratified the final position statement. These included (1) the International Immunocompromised Host Society; (2) the European Society of Clinical Microbiology and Infectious Diseases Study Group for Infections in Compromised Hosts; (3) the European Conference on Infections in Leukaemia; (4) the European Society for Blood and Marrow Transplantation Infectious Diseases Working Party; (5) the Transplant Infectious Disease Section of The Transplantation Society; (6) the Infectious Disease Community of Practice of the American Society of Transplantation; and (7) the Immunocompromised Host Special Interest Group of the Australasian Society for Infectious Diseases.

The study group established that a core minimum reporting dataset (abbreviated as SCORE and provided in Table 1) for collecting information about infections in the immunocompromised based on strengths of available clinical, microbiological or radiological evidence and must include:

- Site of infection
- Severity of infection, qualified by Grades 1 through 5 ('localised, requiring no intervention' to 'death from or with infection').
- Category of infection with pathogen (organism) classification (bacterial, viral, fungal, other)
- Infection outcomes

Table 1: Minimum core reporting dataset

	Comments
Category of infectious complication	
Microbiologically defined infection	Clinical syndrome and compatible microbiology; subcategorise to bacterial, viral, fungal, or other (eg, parasite)
Clinically defined infection	Clinical syndrome and no compatible microbiology
Fever syndrome of unknown focus	Fever and systemic inflammation but no other organ or site-specific symptoms and no compatible microbiology, despite a minimum set of diagnostic investigations being done
Severity of infection	
Grade 1	Localised; local or no intervention required
Grade 2	At least oral antimicrobial treatment required; outpatient setting
Grade 3	At least intravenous treatment required or inpatient setting necessary for clinical management; invasive intervention indicated (eg, drainage)
Grade 4	Life-threatening; urgent invasive intervention, intensive care, inotrope, or ventilator support required
Grade 5	Death from or with infection
Pathogen	
Bacterial, viral, fungal, or other	Use if criteria for microbiologically defined infection are fulfilled; consider as breakthrough infection if patient on appropriate antimicrobial prophylaxis or treatment against pathogen of interest; report only plausible pathogens (eg, do not report results of a single blood culture for a skin contaminant; see table 2); reporting of more than one pathogen is possible for mixed infections
Site of infection	
Respiratory tract, urinary tract, bloodstream, CNS, skin or soft tissue, gastrointestinal, genital, ophthalmic, multiple, other, or unknown	Multiple sites means at least two non-contiguous sites, disseminated or systemic (for reactivation of viral infections); indicate all sites involved
Outcomes associated with infection	
Hospital admission, intensive care unit admission, or death	Yes or no

SCORE criteria flex to accommodate additional variables depending on the nature of the research. For example, SCORE criteria for randomised control trials recommending collecting more contextual information, including but not limited to data on infection time course (ongoing vs historical) and grouping (e.g. upper respiratory tract infection), as well as detail on the prophylactic policies utilised by participating centres and the rate of uptake of these. All definitions used to diagnose and classify the patient and their infection (e.g. type, syndrome, and severity) during the trial must also be clearly cited. This ensures participating sites are utilising and reporting against the same definitions. For observational studies, meanwhile, the expert group recommends enhancing the core offering to include data collection on patient treatment history (e.g. chemotherapy) and the clinical factors that could be contributing to infection risks. Pathogen-centric studies should report on detailed pathogen descriptors (e.g. methods and results of susceptibility testing). For immunocompromised patients, the additional challenges when it comes to clinical interpretation of microbiological results were highlighted. These recommendations both standardise and enhance current reporting on infections amongst immunosuppressed patients and subsequent health outcomes.

However, it is acknowledged that many research centres do not have access to the full battery of diagnostic tests that would be required to meet enhanced SCORE criteria. Conversely, the study group acknowledges that future iterations will also have to accommodate novel testing technologies, including genomic-based or metabolomic-based pathogen detection, for those institutions where this is standard practice. Better data capture methods must also be explored as a matter of urgency: collecting standardised infection data from electronic medical records has significant prospective value for precision research. At present, free text, inaccurate or unstructured data entry have undermined these efforts and the codification and linkage of laboratory results have been especially poor. Harnessing natural language processing is one recommendation to facilitate these improvements - a technology that has only very recently been applied to immunocompromised patient data.

Despite the limitations recognised, as a collective, the collective expert groups identified a standardised method for reporting infections events and associated complications in the immunocompromised. If adopted widely, this will have significant prospective benefits for the diagnosis and treatment of immunocompromised patients and, in turn, the targeting of infection prevention strategies for this diverse group.

A brief introduction to digital phenotyping

A digital phenotype is a machine-readable taxonomy, made up of relationships and rules that can be applied to computerised medical records (CMRs) in algorithmic format to extract specific cohorts or events of interest. Rules are comprised of logical expressions and data elements – in this instance, relevant clinical codes or concepts – and are implemented into CMR systems via computerised queries.

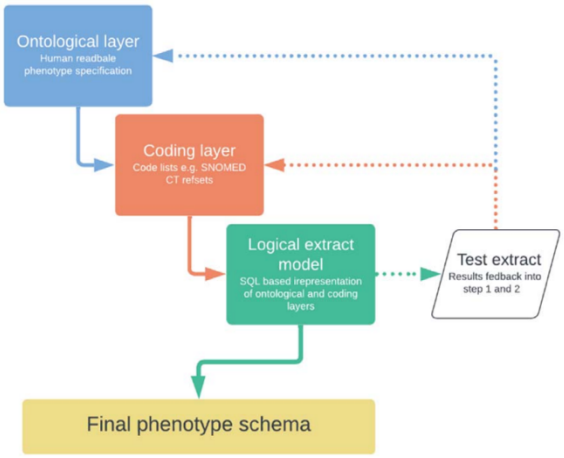
In this way, digital phenotypes can be constructed for all manner of clinical populations, procedures, and events. In the spirit of open science, these resources can be shared between organisations to expedite research efforts. A range of public phenotype libraries have been created for this purpose.

However, organisations differ in their approach to phenotype development. At the Royal College of General Practitioners (RCGP) Research and Surveillance Centre (RSC), the English Primary Care Sentinel Network, this process is traditionally three-step. As elaborated upon below and illustrated in Figure 1, a conceptual phenotype is processed via an ontological layer, a coding layer, and a logical data extract layer – all of which are quality assured by additional team members.

1. The ontological layer - a human-readable description of key concepts within, and relationships between, a given phenotype.
2. The coding layer – where conceptual phenotype layers are translated into their constituent clinical codes and thematic categories.
3. The logical data extract layer – where ontological rules, expressing the relationships between phenotype levels and their respective eligibility criteria, are converted into Structured Query Language (SQL) expressions to extract desired data from the overall pool(s) available.

Once this processing is complete, phenotype-derived extracts are tested for face validity and compared to reference sources. Major disparities at this stage are used to refine previous layers' input. Those that pass this additional scrutiny are then uploaded into the aforementioned libraries and implemented into real-world evidence.

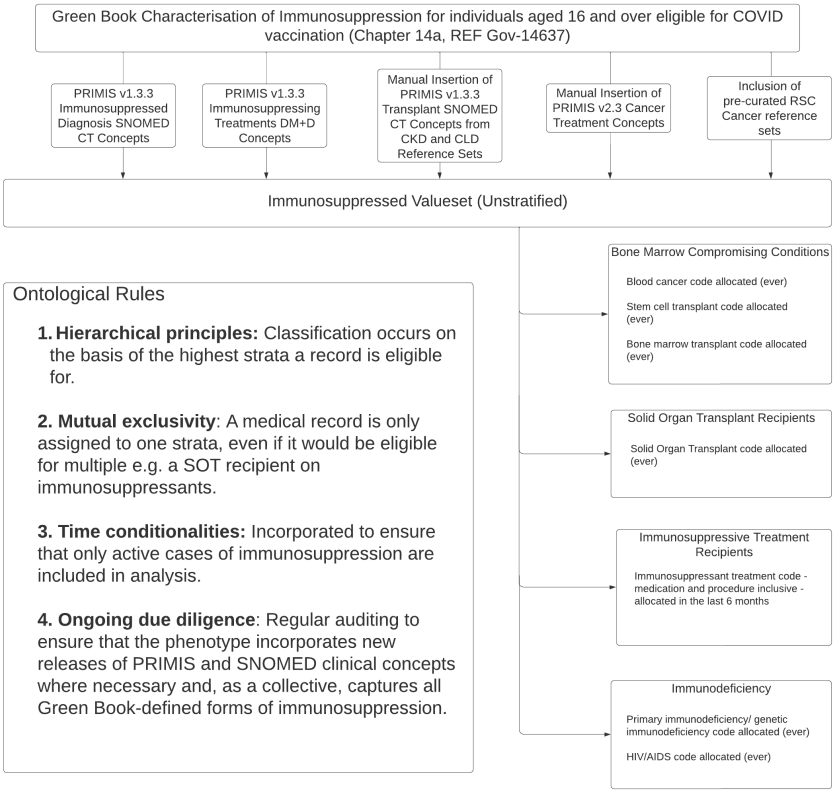
Figure 1: A three-layered approach to instituting a novel phenotype, as implemented by the RCGP RSC



Visualised in Figure 2, this process was applied to convert a COVID risk-stratified taxonomy for adult immunosuppression into a multi-level, CMR compatible phenotype. Serving as the ontological layer in this example, this taxonomy surfaced through rapid literature review into differential COVID-19 mortality amongst the immunosuppressed (as classified by Chapter 14a of the *Immunisation against infectious disease: The Green Book*.). Out of this exercise, the following four levels were identified as most valuable for subdividing the immunosuppressed in descending order of vulnerability to COVID-19: 1) Bone marrow compromising conditions, 2) Solid Organ Transplant recipients, 3) Immunosuppressive treatment recipients and 4) Immunodeficiency.

The coding layer, meanwhile, leveraged existing RSC data assets and clinical risk group codelists from the Primary Care Information Services (PRIMIS) at the University of Nottingham. Here, immunosuppressed concepts from pre-curated RSC cancer reference sets and PRIMIS versions 1.3 and 2.3 (all designated in Systematised Nomenclature of Medicine Clinical Terms [SNOMED CT]) were aggregated, refined, and subdivided to create the valueset that would target data extraction. Finally, a logical extract model was constructed to incorporate the time and dose conditions of immunosuppression specified in The Green Book. Hierarchical principles and mutual exclusivity were also codified to ensure that, once applied within real-world data, this pilot immunosuppressed phenotype would only allocate patients into the highest risk level that they were eligible. Now fully curated, this pilot phenotype is ready to extract immunosuppressed populations from SNOMED CT compatible databases and subdivide desired outcomes by level of COVID risk.

Figure 2: Clinical logic flow of the pilot immunosuppressed phenotype



It is our intention to leverage the collective expertise of the eDelphi panel to construct a more definitive COVID risk-stratified phenotype for adult immunosuppression. We will present panellists with draft taxonomies – one multi-level (as above), the other higher vs lower risk categorised - that will be refined through each round of eDelphi questioning. The final discussion group will be an opportunity for panellists to voice any remaining points of disagreement before these taxonomies are converted into digital phenotypes as above.

Once machine-readable, these eDelphi phenotypes for adult immunosuppression will be incorporated as standard into RSC dataflows to enhance disease surveillance and pharmacovigilance amongst this diverse clinical risk group.

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CONSENT FORM

The inaugural UK eDElphi STudy to DefINe and Risk-Stratify ImmunosupprESsion (The DESTINIES Study)

Name of Researcher: Meredith Leston

If you agree, please initial box

1. I confirm that I have read all pre-read materials for this study.	
2. I confirm that I have had the opportunity to consider the information, ask questions, and have these answered satisfactorily.	
3. I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason.	
4. I agree to the final discussion group being audio recorded.	
5. I agree to take part in this study.	

_____	_____	_____
Name of Participant	*Date*	*Signature*
Meredith Leston	18.04.24	
Name of Person taking Consent	*Date*	*Signature*

Appendix 12: DESTINIES Study Question Set

Round 1, n = 64

- *Appraisal of candidate diagnoses' appropriateness for inclusion in a digital phenotype for 'adult immunosuppression', higher versus lower risk status for COVID-19 severe outcomes and excess vulnerability compared to the immunocompetent.*
- *Opportunity for panellists to recommend additional diagnoses for consideration.*
- *Assessment of a range of clinical consensus statements.*

Please enter your Panellist ID number.
Q1a: To what extent do you agree with the following statements? [Immunosuppression is poorly defined]
Q1a: To what extent do you agree with the following statements? [Our current clinical definition for immunosuppression is too expansive]
Q1a: To what extent do you agree with the following statements? [Our current clinical definition for immunosuppression is not expansive enough]
Q1a: To what extent do you agree with the following statements? [The terms 'immunosuppression' and 'immunocompromised' can be used interchangeably]
Q1a: To what extent do you agree with the following statements? [The needs of the immunosuppressed are sufficiently prioritised in times of public health emergency]
Q1a: To what extent do you agree with the following statements? [COVID-19 no longer poses a real risk to the immunosuppressed]
Q1a: To what extent do you agree with the following statements? [Vulnerability to COVID-19 is similar for all immunosuppressed subgroups]
Q1a: To what extent do you agree with the following statements? [It is easy to pick out the immunosuppressed subgroups at most risk for COVID-19]
Q1a: To what extent do you agree with the following statements? [The immunosuppressed subgroups that are at the most risk for COVID-19 are the same subgroups at most risk for other infectious diseases (RSV, influenza, bacterial pneumonia etc.)]
Q1a: To what extent do you agree with the following statements? [COVID care for the immunosuppressed – including vaccination and the release of antivirals and other resources – is overly one size fits all]
Q1b: Please justify your answers to Q1a, specifying if there were any areas where you were uncertain and why.
Q2a: The following conditions are explicitly referenced in the UK characterisation of immunosuppression. In your expert opinion, how appropriate is their inclusion? [Solid organ transplantation]
Q2a: The following conditions are explicitly referenced in the UK characterisation of immunosuppression. In your expert opinion, how appropriate is their inclusion? [Bone marrow transplantation]
Q2a: The following conditions are explicitly referenced in the UK characterisation of immunosuppression. In your expert opinion, how appropriate is their inclusion? [Stem cell transplantation]
Q2a: The following conditions are explicitly referenced in the UK characterisation of immunosuppression. In your expert opinion, how appropriate is their inclusion? [Haematological malignancies]
Q2a: The following conditions are explicitly referenced in the UK characterisation of immunosuppression. In your expert opinion, how appropriate is their inclusion? [HIV infection at all stages]

Q2a: The following conditions are explicitly referenced in the UK characterisation of immunosuppression. In your expert opinion, how appropriate is their inclusion? [Genetic disorders affecting the immune system (e.g. SCID, complement disorder, IRAK-4, NEMO)]
Q2a: The following conditions are explicitly referenced in the UK characterisation of immunosuppression. In your expert opinion, how appropriate is their inclusion? [Systemic lupus erythematosus]
Q2a: The following conditions are explicitly referenced in the UK characterisation of immunosuppression. In your expert opinion, how appropriate is their inclusion? [Rheumatoid arthritis]
Q2a: The following conditions are explicitly referenced in the UK characterisation of immunosuppression. In your expert opinion, how appropriate is their inclusion? [Inflammatory bowel disease]
Q2a: The following conditions are explicitly referenced in the UK characterisation of immunosuppression. In your expert opinion, how appropriate is their inclusion? [Scleroderma]
Q2a: The following conditions are explicitly referenced in the UK characterisation of immunosuppression. In your expert opinion, how appropriate is their inclusion? [Psoriasis]
Q2b: Please justify your answers to Q2a, specifying if there were any areas where you were uncertain and why.
Q3a: The following conditions are not explicitly referenced in the UK characterisation of immunosuppression but appear in comparable national and international resources. In your expert opinion, how appropriate would it be to include them going forwards? [Multi-organ transplantation]
Q3a: The following conditions are not explicitly referenced in the UK characterisation of immunosuppression but appear in comparable national and international resources. In your expert opinion, how appropriate would it be to include them going forwards? [Islet transplantation]
Q3a: The following conditions are not explicitly referenced in the UK characterisation of immunosuppression but appear in comparable national and international resources. In your expert opinion, how appropriate would it be to include them going forwards? [Solid tumours]
Q3a: The following conditions are not explicitly referenced in the UK characterisation of immunosuppression but appear in comparable national and international resources. In your expert opinion, how appropriate would it be to include them going forwards? [Generalised malignancies (metastasis)]
Q3a: The following conditions are not explicitly referenced in the UK characterisation of immunosuppression but appear in comparable national and international resources. In your expert opinion, how appropriate would it be to include them going forwards? [Drug-managed HIV]
Q3a: The following conditions are not explicitly referenced in the UK characterisation of immunosuppression but appear in comparable national and international resources. In your expert opinion, how appropriate would it be to include them going forwards? [Untreated HIV]
Q3a: The following conditions are not explicitly referenced in the UK characterisation of immunosuppression but appear in comparable national and international resources. In your expert opinion, how appropriate would it be to include them going forwards? [AIDS]
Q3a: The following conditions are not explicitly referenced in the UK characterisation of immunosuppression but appear in comparable national and international resources. In your expert opinion, how appropriate would it be to include them going forwards? [Down Syndrome]
Q3a: The following conditions are not explicitly referenced in the UK characterisation of immunosuppression but appear in comparable national and international resources. In your expert opinion, how appropriate would it be to include them going forwards? [Autoimmune skin diseases (e.g. Dermatitis herpetiformis, Vitiligo, Pemphigus, Dermatomyositis, etc.)]

Q3a: The following conditions are not explicitly referenced in the UK characterisation of immunosuppression but appear in comparable national and international resources. In your expert opinion, how appropriate would it be to include them going forwards? [Rheumatologic Disorders (e.g. Sjögren's syndrome, Ankylosing spondylitis, Gout etc.)]
Q3a: The following conditions are not explicitly referenced in the UK characterisation of immunosuppression but appear in comparable national and international resources. In your expert opinion, how appropriate would it be to include them going forwards? [Gastrointestinal Autoimmune Diseases (e.g. Celiac disease, Ulcerative colitis, Autoimmune hepatitis)]
Q3a: The following conditions are not explicitly referenced in the UK characterisation of immunosuppression but appear in comparable national and international resources. In your expert opinion, how appropriate would it be to include them going forwards? [Endocrine Autoimmune disorders (e.g. Type 1 diabetes mellitus, Hashimoto's thyroiditis, Graves' disease, Addison's disease etc.)]
Q3a: The following conditions are not explicitly referenced in the UK characterisation of immunosuppression but appear in comparable national and international resources. In your expert opinion, how appropriate would it be to include them going forwards? [Neurological Autoimmune Conditions (e.g. Multiple sclerosis, Myasthenia gravis, Autoimmune encephalitis, Guillain-Barré syndrome etc.)]
Q3a: The following conditions are not explicitly referenced in the UK characterisation of immunosuppression but appear in comparable national and international resources. In your expert opinion, how appropriate would it be to include them going forwards? [Hematological Autoimmune Disorders (e.g. Evan's syndrome, Immune thrombocytopenic purpura, Antiphospholipid syndrome etc.)]
Q3a: The following conditions are not explicitly referenced in the UK characterisation of immunosuppression but appear in comparable national and international resources. In your expert opinion, how appropriate would it be to include them going forwards? [Renal Autoimmune Diseases (e.g. Lupus nephritis, Glomerulonephritis, IgA nephropathy etc.)]
Q3a: The following conditions are not explicitly referenced in the UK characterisation of immunosuppression but appear in comparable national and international resources. In your expert opinion, how appropriate would it be to include them going forwards? [Opthalmologic autoimmune conditions (e.g. Uveitis, Graves' ophthalmopathy etc.)]
Q3a: The following conditions are not explicitly referenced in the UK characterisation of immunosuppression but appear in comparable national and international resources. In your expert opinion, how appropriate would it be to include them going forwards? [Underlying aberrant immunity (e.g. graft-vs-host disease, graft rejection, absent or incomplete immune reconstitution, neutropenia ANC, lymphopenia ALC)]
Q3a: The following conditions are not explicitly referenced in the UK characterisation of immunosuppression but appear in comparable national and international resources. In your expert opinion, how appropriate would it be to include them going forwards? [Type 2 diabetes mellitus]
Q3a: The following conditions are not explicitly referenced in the UK characterisation of immunosuppression but appear in comparable national and international resources. In your expert opinion, how appropriate would it be to include them going forwards? [Asplenia (anatomic/functional)]
Q3a: The following conditions are not explicitly referenced in the UK characterisation of immunosuppression but appear in comparable national and international resources. In your expert opinion, how appropriate would it be to include them going forwards? [Aplastic anemia]
Q3a: The following conditions are not explicitly referenced in the UK characterisation of immunosuppression but appear in comparable national and international resources. In your expert opinion, how appropriate would it be to include them going forwards? [Sickle cell disease]
Q3a: The following conditions are not explicitly referenced in the UK characterisation of immunosuppression but appear in comparable national and international resources. In

your expert opinion, how appropriate would it be to include them going forwards? [Chronic kidney disease]
Q3a: The following conditions are not explicitly referenced in the UK characterisation of immunosuppression but appear in comparable national and international resources. In your expert opinion, how appropriate would it be to include them going forwards? [Nephrotic syndrome]
Q3a: The following conditions are not explicitly referenced in the UK characterisation of immunosuppression but appear in comparable national and international resources. In your expert opinion, how appropriate would it be to include them going forwards? [Dialysis]
Q3a: The following conditions are not explicitly referenced in the UK characterisation of immunosuppression but appear in comparable national and international resources. In your expert opinion, how appropriate would it be to include them going forwards? [Cerebrospinal fluid leak]
Q3a: The following conditions are not explicitly referenced in the UK characterisation of immunosuppression but appear in comparable national and international resources. In your expert opinion, how appropriate would it be to include them going forwards? [Cochlear implant]
Q3a: The following conditions are not explicitly referenced in the UK characterisation of immunosuppression but appear in comparable national and international resources. In your expert opinion, how appropriate would it be to include them going forwards? [Burn injuries]
Q3a: The following conditions are not explicitly referenced in the UK characterisation of immunosuppression but appear in comparable national and international resources. In your expert opinion, how appropriate would it be to include them going forwards? [Pregnancy]
Q3a: The following conditions are not explicitly referenced in the UK characterisation of immunosuppression but appear in comparable national and international resources. In your expert opinion, how appropriate would it be to include them going forwards? [Chronic stress]
Q3a: The following conditions are not explicitly referenced in the UK characterisation of immunosuppression but appear in comparable national and international resources. In your expert opinion, how appropriate would it be to include them going forwards? [Sleep deprivation]
Q3a: The following conditions are not explicitly referenced in the UK characterisation of immunosuppression but appear in comparable national and international resources. In your expert opinion, how appropriate would it be to include them going forwards? [Malnutrition]
Q3a: The following conditions are not explicitly referenced in the UK characterisation of immunosuppression but appear in comparable national and international resources. In your expert opinion, how appropriate would it be to include them going forwards? [Stunting]
Q3a: The following conditions are not explicitly referenced in the UK characterisation of immunosuppression but appear in comparable national and international resources. In your expert opinion, how appropriate would it be to include them going forwards? [Anorexia Nervosa]
Q3b: Please justify your answers to Q3a, specifying if there were any areas where you were uncertain and why.
Q4: Were there any conditions you were expecting to see that were not listed in either Q2 or Q3? If yes, please name them.
Q5a: To what extent do you agree with the following statements: Immunosuppression would not be conferred if... [The patient's cancer is in remission]
Q5a: To what extent do you agree with the following statements: Immunosuppression would not be conferred if... [The patient's cancer is currently untreated]
Q5a: To what extent do you agree with the following statements: Immunosuppression would not be conferred if... [The patient's cancer is classed as Early Stage (Stage I)]

Q5a: To what extent do you agree with the following statements: Immunosuppression would not be conferred if... [The patient's HIV is drug-managed]
Q5a: To what extent do you agree with the following statements: Immunosuppression would not be conferred if... [The patient's inflammatory disease is currently untreated]
Q5a: To what extent do you agree with the following statements: Immunosuppression would not be conferred if... [The patient has received immunosuppressive therapy for less than 6 months]
Q5a: To what extent do you agree with the following statements: Immunosuppression would not be conferred if... [The patient's immunosuppressive regimen was discontinued more than 6 months ago]
Q5a: To what extent do you agree with the following statements: Immunosuppression would not be conferred if... [The patient's immunosuppressive regimen was discontinued more than 1 year ago]
Q5a: To what extent do you agree with the following statements: Immunosuppression would not be conferred if... [The patient is on low-dose immunosuppressives (equivalent of < 20mg of prednisone per day)]
Q5b: Please justify your answers to Q5a, specifying if there were any areas where you were uncertain and why.
Q6a: Please specify whether you consider the following conditions at higher or lower risk for severe COVID-19 outcomes? [Solid organ transplantation]
Q6a: Please specify whether you consider the following conditions at higher or lower risk for severe COVID-19 outcomes? [Bone marrow transplantation]
Q6a: Please specify whether you consider the following conditions at higher or lower risk for severe COVID-19 outcomes? [Stem cell transplantation]
Q6a: Please specify whether you consider the following conditions at higher or lower risk for severe COVID-19 outcomes? [Multi-organ transplantation]
Q6a: Please specify whether you consider the following conditions at higher or lower risk for severe COVID-19 outcomes? [Islet transplantation]
Q6a: Please specify whether you consider the following conditions at higher or lower risk for severe COVID-19 outcomes? [Haematological malignancies]
Q6a: Please specify whether you consider the following conditions at higher or lower risk for severe COVID-19 outcomes? [Solid tumours]
Q6a: Please specify whether you consider the following conditions at higher or lower risk for severe COVID-19 outcomes? [Generalised malignancies (metastasis)]
Q6a: Please specify whether you consider the following conditions at higher or lower risk for severe COVID-19 outcomes? [Actively-treated malignancy]
Q6a: Please specify whether you consider the following conditions at higher or lower risk for severe COVID-19 outcomes? [HIV infection all stages]
Q6a: Please specify whether you consider the following conditions at higher or lower risk for severe COVID-19 outcomes? [Drug-managed HIV]
Q6a: Please specify whether you consider the following conditions at higher or lower risk for severe COVID-19 outcomes? [Untreated HIV]
Q6a: Please specify whether you consider the following conditions at higher or lower risk for severe COVID-19 outcomes? [AIDS]
Q6a: Please specify whether you consider the following conditions at higher or lower risk for severe COVID-19 outcomes? [Genetic disorders affecting the immune system (e.g. SCID, complement disorder, IRAK-4, NEMO)]
Q6a: Please specify whether you consider the following conditions at higher or lower risk for severe COVID-19 outcomes? [Down Syndrome]
Q6a: Please specify whether you consider the following conditions at higher or lower risk for severe COVID-19 outcomes? [Autoimmune skin diseases (e.g. Psoriasis, Dermatitis herpetiformis, Vitiligo, Pemphigus, Scleroderma, Dermatomyositis, etc.)]
Q6a: Please specify whether you consider the following conditions at higher or lower risk for severe COVID-19 outcomes? [Rheumatologic Disorders (e.g. Systemic lupus

erythematosus, Rheumatoid Arthritis, Sjögren's syndrome, Ankylosing spondylitis, Gout etc.)]
Q6a: Please specify whether you consider the following conditions at higher or lower risk for severe COVID-19 outcomes? [Gastrointestinal Autoimmune Diseases (e.g. Inflammatory Bowel Syndrome, Celiac disease, Ulcerative colitis, Autoimmune hepatitis)]
Q6a: Please specify whether you consider the following conditions at higher or lower risk for severe COVID-19 outcomes? [Endocrine Autoimmune disorders (e.g. Type 1 diabetes mellitus, Hashimoto's thyroiditis, Graves' disease, Addison's disease etc.)]
Q6a: Please specify whether you consider the following conditions at higher or lower risk for severe COVID-19 outcomes? [Neurological Autoimmune Conditions (e.g. Multiple sclerosis, Myasthenia gravis, Autoimmune encephalitis, Guillain-Barré syndrome etc.)]
Q6a: Please specify whether you consider the following conditions at higher or lower risk for severe COVID-19 outcomes? [Hematological Autoimmune Disorders (e.g. Evan's syndrome, Immune thrombocytopenic purpura, Antiphospholipid syndrome etc.)]
Q6a: Please specify whether you consider the following conditions at higher or lower risk for severe COVID-19 outcomes? [Renal Autoimmune Diseases (e.g. Lupus nephritis, Glomerulonephritis, IgA nephropathy etc.)]
Q6a: Please specify whether you consider the following conditions at higher or lower risk for severe COVID-19 outcomes? [Opthalmologic autoimmune conditions (e.g. Uveitis, Graves' ophthalmopathy etc.)]
Q6a: Please specify whether you consider the following conditions at higher or lower risk for severe COVID-19 outcomes? [Underlying aberrant immunity (e.g. graft-vs-host disease, graft rejection, absent or incomplete immune reconstitution, neutropenia ANC, lymphopenia ALC)]
Q6a: Please specify whether you consider the following conditions at higher or lower risk for severe COVID-19 outcomes? [Type 2 diabetes mellitus]
Q6a: Please specify whether you consider the following conditions at higher or lower risk for severe COVID-19 outcomes? [Asplenia (anatomic/ functional)]
Q6a: Please specify whether you consider the following conditions at higher or lower risk for severe COVID-19 outcomes? [Aplastic anemia]
Q6a: Please specify whether you consider the following conditions at higher or lower risk for severe COVID-19 outcomes? [Sickle cell disease]
Q6a: Please specify whether you consider the following conditions at higher or lower risk for severe COVID-19 outcomes? [Chronic kidney disease]
Q6a: Please specify whether you consider the following conditions at higher or lower risk for severe COVID-19 outcomes? [Nephrotic syndrome]
Q6a: Please specify whether you consider the following conditions at higher or lower risk for severe COVID-19 outcomes? [Dialysis]
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Q6a: Please specify whether you consider the following conditions at higher or lower risk for severe COVID-19 outcomes? [Burn injuries]
Q6a: Please specify whether you consider the following conditions at higher or lower risk for severe COVID-19 outcomes? [Pregnancy]
Q6a: Please specify whether you consider the following conditions at higher or lower risk for severe COVID-19 outcomes? [Chronic stress]
Q6a: Please specify whether you consider the following conditions at higher or lower risk for severe COVID-19 outcomes? [Sleep deprivation]
Q6a: Please specify whether you consider the following conditions at higher or lower risk for severe COVID-19 outcomes? [Malnutrition]
Q6a: Please specify whether you consider the following conditions at higher or lower risk for severe COVID-19 outcomes? [Stunting]

Q6a: Please specify whether you consider the following conditions at higher or lower risk for severe COVID-19 outcomes? [Anorexia Nervosa]
Q6b: Please justify your answers to Q6a, specifying if there were any areas where you were uncertain and why.
Q7a: Please specify how vulnerable you consider the following conditions are to severe COVID-19 infection outcomes. [Solid organ transplantation]
Q7a: Please specify how vulnerable you consider the following conditions are to severe COVID-19 infection outcomes. [Bone marrow transplantation]
Q7a: Please specify how vulnerable you consider the following conditions are to severe COVID-19 infection outcomes. [Stem cell transplantation]
Q7a: Please specify how vulnerable you consider the following conditions are to severe COVID-19 infection outcomes. [Multi-organ transplantation]
Q7a: Please specify how vulnerable you consider the following conditions are to severe COVID-19 infection outcomes. [Islet transplantation]
Q7a: Please specify how vulnerable you consider the following conditions are to severe COVID-19 infection outcomes. [Haematological malignancies]
Q7a: Please specify how vulnerable you consider the following conditions are to severe COVID-19 infection outcomes. [Solid tumours]
Q7a: Please specify how vulnerable you consider the following conditions are to severe COVID-19 infection outcomes. [Generalised malignancies (metastasis)]
Q7a: Please specify how vulnerable you consider the following conditions are to severe COVID-19 infection outcomes. [Actively-treated malignancy]
Q7a: Please specify how vulnerable you consider the following conditions are to severe COVID-19 infection outcomes. [HIV infection all stages]
Q7a: Please specify how vulnerable you consider the following conditions are to severe COVID-19 infection outcomes. [Drug-managed HIV]
Q7a: Please specify how vulnerable you consider the following conditions are to severe COVID-19 infection outcomes. [Untreated HIV]
Q7a: Please specify how vulnerable you consider the following conditions are to severe COVID-19 infection outcomes. [AIDS]
Q7a: Please specify how vulnerable you consider the following conditions are to severe COVID-19 infection outcomes. [Genetic disorders affecting the immune system (e.g. SCID, complement disorder, IRAK-4, NEMO)]
Q7a: Please specify how vulnerable you consider the following conditions are to severe COVID-19 infection outcomes. [Down Syndrome]
Q7a: Please specify how vulnerable you consider the following conditions are to severe COVID-19 infection outcomes. [Autoimmune skin diseases (e.g. Psoriasis, Dermatitis herpetiformis, Vitiligo, Pemphigus, Scleroderma, Dermatomyositis, etc.)]
Q7a: Please specify how vulnerable you consider the following conditions are to severe COVID-19 infection outcomes. [Rheumatologic Disorders (e.g. Systemic lupus erythematosus, Rheumatoid Arthritis, Sjögren's syndrome, Ankylosing spondylitis, Gout etc.)]
Q7a: Please specify how vulnerable you consider the following conditions are to severe COVID-19 infection outcomes. [Gastrointestinal Autoimmune Diseases (e.g. Inflammatory Bowel Syndrome, Celiac disease, Ulcerative colitis, Autoimmune hepatitis)]
Q7a: Please specify how vulnerable you consider the following conditions are to severe COVID-19 infection outcomes. [Endocrine Autoimmune disorders (e.g. Type 1 diabetes mellitus, Hashimoto’s thyroiditis, Graves' disease, Addison’s disease etc.)]
Q7a: Please specify how vulnerable you consider the following conditions are to severe COVID-19 infection outcomes. [Neurological Autoimmune Conditions (e.g. Multiple sclerosis, Myasthenia gravis, Autoimmune encephalitis, Guillain-Barré syndrome etc.)]
Q7a: Please specify how vulnerable you consider the following conditions are to severe COVID-19 infection outcomes. [Hematological Autoimmune Disorders (e.g. Evan’s syndrome, Immune thrombocytopenic purpura, Antiphospholipid syndrome etc.)]

Q7a: Please specify how vulnerable you consider the following conditions are to severe COVID-19 infection outcomes. [Renal Autoimmune Diseases (e.g. Lupus nephritis, Glomerulonephritis, IgA nephropathy etc.)]
Q7a: Please specify how vulnerable you consider the following conditions are to severe COVID-19 infection outcomes. [Opthalmologic autoimmune conditions (e.g. Uveitis, Graves' ophthalmopathy etc.)]
Q7a: Please specify how vulnerable you consider the following conditions are to severe COVID-19 infection outcomes. [Underlying aberrant immunity (e.g. graft-vs-host disease, graft rejection, absent or incomplete immune reconstitution, neutropenia ANC, lymphopenia ALC)]
Q7a: Please specify how vulnerable you consider the following conditions are to severe COVID-19 infection outcomes. [Type 2 diabetes mellitus]
Q7a: Please specify how vulnerable you consider the following conditions are to severe COVID-19 infection outcomes. [Asplenia (anatomic/ functional)]
Q7a: Please specify how vulnerable you consider the following conditions are to severe COVID-19 infection outcomes. [Aplastic anemia]
Q7a: Please specify how vulnerable you consider the following conditions are to severe COVID-19 infection outcomes. [Sickle cell disease]
Q7a: Please specify how vulnerable you consider the following conditions are to severe COVID-19 infection outcomes. [Chronic kidney disease]
Q7a: Please specify how vulnerable you consider the following conditions are to severe COVID-19 infection outcomes. [Nephrotic syndrome]
Q7a: Please specify how vulnerable you consider the following conditions are to severe COVID-19 infection outcomes. [Dialysis]
Q7a: Please specify how vulnerable you consider the following conditions are to severe COVID-19 infection outcomes. [Cerebrospinal fluid leak]
Q7a: Please specify how vulnerable you consider the following conditions are to severe COVID-19 infection outcomes. [Cochlear implant]
Q7a: Please specify how vulnerable you consider the following conditions are to severe COVID-19 infection outcomes. [Burn injuries]
Q7a: Please specify how vulnerable you consider the following conditions are to severe COVID-19 infection outcomes. [Pregnancy]
Q7a: Please specify how vulnerable you consider the following conditions are to severe COVID-19 infection outcomes. [Chronic stress]
Q7a: Please specify how vulnerable you consider the following conditions are to severe COVID-19 infection outcomes. [Sleep deprivation]
Q7a: Please specify how vulnerable you consider the following conditions are to severe COVID-19 infection outcomes. [Malnutrition]
Q7a: Please specify how vulnerable you consider the following conditions are to severe COVID-19 infection outcomes. [Stunting]
Q7a: Please specify how vulnerable you consider the following conditions are to severe COVID-19 infection outcomes. [Anorexia Nervosa]
Q7b: Please justify your answers to Q7a, specifying if there were any areas where you were uncertain and why.

Round 2, n = 60

- *Evaluation of first draft of phenotypes (Risk-Categorised and Risk-Stratified).*
- *Appraisal of candidate diagnoses' (including those recommended by panellists in previous round) appropriateness for inclusion in a digital phenotype for 'adult immunosuppression', higher versus lower risk status for COVID-19 severe outcomes and excess vulnerability compared to the immunocompetent.*
- *Assessment of a range of clinical consensus statements.*

Please enter your Panellist ID number.
1a. To what extent to you agree with the following descriptions of the draft COVID-19 Risk Categorised Phenotype for Adult Immunosuppression (Phenotype 1)? For your convenience, please reference the Draft Phenotypes document linked while answering this question. [This phenotype is an accurate representation of results from the last round]
1a. To what extent to you agree with the following descriptions of the draft COVID-19 Risk Categorised Phenotype for Adult Immunosuppression (Phenotype 1)? For your convenience, please reference the Draft Phenotypes document linked while answering this question. [In reference to the immunosuppressed spectrum, this phenotype correctly allocates conditions into Higher vs Lower risk for severe COVID-19 outcomes]
1a. To what extent to you agree with the following descriptions of the draft COVID-19 Risk Categorised Phenotype for Adult Immunosuppression (Phenotype 1)? For your convenience, please reference the the Draft Phenotypes document linked while answering this question. [This phenotype represents a step forward for subdividing immunosuppressed COVID infection outcomes]
1a. To what extent to you agree with the following descriptions of the draft COVID-19 Risk Categorised Phenotype for Adult Immunosuppression (Phenotype 1)? For your convenience, please reference the Draft Phenotypes document linked while answering this question. [It would be useful to apply this phenotype to subdivide immunosuppressed outcomes for other diseases (seasonal influenza, pneumonia, RSV etc.)]
Q1b: Please justify your answers to Q1a, specifying if there were any areas where you were uncertain and why.
2a. To what extent to you agree with the following descriptions of the draft COVID-19 Risk Stratified Phenotype for Adult Immunosuppression (Phenotype 2)? For your convenience, please reference the Draft Phenotypes document linked while answering this question. [This phenotype is an accurate representation of results from the last round]
2a. To what extent to you agree with the following descriptions of the draft COVID-19 Risk Stratified Phenotype for Adult Immunosuppression (Phenotype 2)? For your convenience, please reference the Draft Phenotypes document linked while answering this question. [The levels of this phenotype are presented in the correct order (descending levels of risk for severe COVID-19 outcomes)]
2a. To what extent to you agree with the following descriptions of the draft COVID-19 Risk Stratified Phenotype for Adult Immunosuppression (Phenotype 2)? For your convenience, please reference the Draft Phenotypes document linked while answering this question. [Conditions are correctly allocated to phenotype levels]
2a. To what extent to you agree with the following descriptions of the draft COVID-19 Risk Stratified Phenotype for Adult Immunosuppression (Phenotype 2)? For your convenience, please reference the Draft Phenotypes document linked while answering this question. [This phenotype represents a step forward for subdividing immunosuppressed COVID-19 infection outcomes]
2a. To what extent to you agree with the following descriptions of the draft COVID-19 Risk Stratified Phenotype for Adult Immunosuppression (Phenotype 2)? For your convenience, please reference the Draft Phenotypes document linked while answering this question. [It

would be useful to apply this phenotype to subdivide immunosuppressed outcomes for other diseases (seasonal influenza, pneumonia, RSV etc.)]
Q2b: Please justify your answers to Q2a, specifying if there were any areas where you were uncertain and why.
Q3a: To what extent do you agree with the following statements? [Immunosuppression is poorly defined]
Q3a: To what extent do you agree with the following statements? [Our current clinical definition for immunosuppression is too expansive]
Q3a: To what extent do you agree with the following statements? [Our current clinical definition for immunosuppression is not expansive enough]
Q3a: To what extent do you agree with the following statements? [The terms 'immunosuppression' and 'immunocompromised' can be used interchangeably]
Q3a: To what extent do you agree with the following statements? [The needs of the immunosuppressed are sufficiently prioritised in times of public health emergency]
Q3a: To what extent do you agree with the following statements? [COVID-19 no longer poses a real risk to the immunosuppressed]
Q3a: To what extent do you agree with the following statements? [Vulnerability to COVID-19 is similar for all immunosuppressed subgroups]
Q3a: To what extent do you agree with the following statements? [It is easy to pick out the immunosuppressed subgroups at most risk for COVID-19]
Q3a: To what extent do you agree with the following statements? [The immunosuppressed subgroups that are at the most risk for COVID-19 are the same subgroups at most risk for other infectious diseases (RSV, influenza, bacterial pneumonia etc.)]
Q3a: To what extent do you agree with the following statements? [COVID care for the immunosuppressed – including vaccination and the release of antivirals and other resources – is overly one size fits all]
3b. Please justify your answers to Q3a, specifying if there were any areas where you were uncertain and why.
Q4a: The following conditions are explicitly referenced in the UK characterisation of immunosuppression. In your expert opinion, how appropriate is their inclusion? [Solid organ transplantation]
Q4a: The following conditions are explicitly referenced in the UK characterisation of immunosuppression. In your expert opinion, how appropriate is their inclusion? [Bone marrow transplantation]
Q4a: The following conditions are explicitly referenced in the UK characterisation of immunosuppression. In your expert opinion, how appropriate is their inclusion? [Stem cell transplantation]
Q4a: The following conditions are explicitly referenced in the UK characterisation of immunosuppression. In your expert opinion, how appropriate is their inclusion? [Haematological malignancies]
Q4a: The following conditions are explicitly referenced in the UK characterisation of immunosuppression. In your expert opinion, how appropriate is their inclusion? [Actively-treated malignancies]
Q4a: The following conditions are explicitly referenced in the UK characterisation of immunosuppression. In your expert opinion, how appropriate is their inclusion? [HIV infection at all stages]
Q4a: The following conditions are explicitly referenced in the UK characterisation of immunosuppression. In your expert opinion, how appropriate is their inclusion? [Genetic disorders affecting the immune system (e.g. SCID, complement disorder, IRAK-4, NEMO, inherited blood disorders)]
Q4a: The following conditions are explicitly referenced in the UK characterisation of immunosuppression. In your expert opinion, how appropriate is their inclusion? [Systemic lupus erythematosus]

Q4a: The following conditions are explicitly referenced in the UK characterisation of immunosuppression. In your expert opinion, how appropriate is their inclusion? [Rheumatoid arthritis]
Q4a: The following conditions are explicitly referenced in the UK characterisation of immunosuppression. In your expert opinion, how appropriate is their inclusion? [Inflammatory bowel disease]
Q4a: The following conditions are explicitly referenced in the UK characterisation of immunosuppression. In your expert opinion, how appropriate is their inclusion? [Scleroderma]
Q4a: The following conditions are explicitly referenced in the UK characterisation of immunosuppression. In your expert opinion, how appropriate is their inclusion? [Psoriasis]
Q4b: Please justify your answers to Q4a, specifying if there were any areas where you were uncertain and why.
Q5a: The following conditions are not explicitly referenced in the UK characterisation of immunosuppression but appear in comparable national and international resources. In your expert opinion, how appropriate would it be to include them going forwards? [Multi-organ transplantation]
Q5a: The following conditions are not explicitly referenced in the UK characterisation of immunosuppression but appear in comparable national and international resources. In your expert opinion, how appropriate would it be to include them going forwards? [Islet transplantation]
Q5a: The following conditions are not explicitly referenced in the UK characterisation of immunosuppression but appear in comparable national and international resources. In your expert opinion, how appropriate would it be to include them going forwards? [Solid tumours]
Q5a: The following conditions are not explicitly referenced in the UK characterisation of immunosuppression but appear in comparable national and international resources. In your expert opinion, how appropriate would it be to include them going forwards? [Generalised malignancies (metastasis)]
Q5a: The following conditions are not explicitly referenced in the UK characterisation of immunosuppression but appear in comparable national and international resources. In your expert opinion, how appropriate would it be to include them going forwards? [Drug-managed HIV]
Q5a: The following conditions are not explicitly referenced in the UK characterisation of immunosuppression but appear in comparable national and international resources. In your expert opinion, how appropriate would it be to include them going forwards? [Untreated HIV]
Q5a: The following conditions are not explicitly referenced in the UK characterisation of immunosuppression but appear in comparable national and international resources. In your expert opinion, how appropriate would it be to include them going forwards? [AIDS-defining illness]
Q5a: The following conditions are not explicitly referenced in the UK characterisation of immunosuppression but appear in comparable national and international resources. In your expert opinion, how appropriate would it be to include them going forwards? [Down Syndrome]
Q5a: The following conditions are not explicitly referenced in the UK characterisation of immunosuppression but appear in comparable national and international resources. In your expert opinion, how appropriate would it be to include them going forwards? [Autoimmune skin diseases (e.g. Dermatitis herpetiformis, Vitiligo, Pemphigus, Dermatomyositis etc.)]
Q5a: The following conditions are not explicitly referenced in the UK characterisation of immunosuppression but appear in comparable national and international resources. In your expert opinion, how appropriate would it be to include them going forwards? [Rheumatologic Disorders (e.g. Systemic lupus erythematosus, Rheumatoid Arthritis,

Sjögren's syndrome, Idiopathic inflammatory myopathies, Ankylosing spondylitis, Vasculitides, Gout etc.)]
Q5a: The following conditions are not explicitly referenced in the UK characterisation of immunosuppression but appear in comparable national and international resources. In your expert opinion, how appropriate would it be to include them going forwards? [Gastrointestinal Autoimmune Diseases (e.g. Celiac disease, Ulcerative colitis, Autoimmune hepatitis)]
Q5a: The following conditions are not explicitly referenced in the UK characterisation of immunosuppression but appear in comparable national and international resources. In your expert opinion, how appropriate would it be to include them going forwards? [Endocrine Autoimmune disorders (e.g. Type 1 diabetes mellitus, Hashimoto's thyroiditis, Graves' disease, Addison's disease etc.)]
Q5a: The following conditions are not explicitly referenced in the UK characterisation of immunosuppression but appear in comparable national and international resources. In your expert opinion, how appropriate would it be to include them going forwards? [Neurological Autoimmune Conditions (e.g. Multiple sclerosis, Myasthenia gravis, Autoimmune encephalitis, Guillain-Barré syndrome etc.)]
Q5a: The following conditions are not explicitly referenced in the UK characterisation of immunosuppression but appear in comparable national and international resources. In your expert opinion, how appropriate would it be to include them going forwards? [Hematological Autoimmune Disorders (e.g. Evan's syndrome, Immune thrombocytopenic purpura, Antiphospholipid syndrome, VEXAS etc.)]
Q5a: The following conditions are not explicitly referenced in the UK characterisation of immunosuppression but appear in comparable national and international resources. In your expert opinion, how appropriate would it be to include them going forwards? [Renal Autoimmune Diseases (e.g. Lupus nephritis, Glomerulonephritis, IgA nephropathy etc.)]
Q5a: The following conditions are not explicitly referenced in the UK characterisation of immunosuppression but appear in comparable national and international resources. In your expert opinion, how appropriate would it be to include them going forwards? [Opthalmologic autoimmune conditions (e.g. Uveitis, Graves' ophthalmopathy etc.)]
Q5a: The following conditions are not explicitly referenced in the UK characterisation of immunosuppression but appear in comparable national and international resources. In your expert opinion, how appropriate would it be to include them going forwards? [Underlying aberrant immunity (e.g. graft-vs-host disease, graft rejection, absent or incomplete immune reconstitution, neutropenia ANC, lymphopenia ALC)]
Q5a: The following conditions are not explicitly referenced in the UK characterisation of immunosuppression but appear in comparable national and international resources. In your expert opinion, how appropriate would it be to include them going forwards? [Type 2 diabetes mellitus]
Q5a: The following conditions are not explicitly referenced in the UK characterisation of immunosuppression but appear in comparable national and international resources. In your expert opinion, how appropriate would it be to include them going forwards? [Asplenia (anatomic/functional)]
Q5a: The following conditions are not explicitly referenced in the UK characterisation of immunosuppression but appear in comparable national and international resources. In your expert opinion, how appropriate would it be to include them going forwards? [Aplastic anemia]
Q5a: The following conditions are not explicitly referenced in the UK characterisation of immunosuppression but appear in comparable national and international resources. In your expert opinion, how appropriate would it be to include them going forwards? [Sickle cell disease]
Q5a: The following conditions are not explicitly referenced in the UK characterisation of immunosuppression but appear in comparable national and international resources. In your expert opinion, how appropriate would it be to include them going forwards? [Chronic kidney disease]

Q5a: The following conditions are not explicitly referenced in the UK characterisation of immunosuppression but appear in comparable national and international resources. In your expert opinion, how appropriate would it be to include them going forwards? [Nephrotic syndrome]
Q5a: The following conditions are not explicitly referenced in the UK characterisation of immunosuppression but appear in comparable national and international resources. In your expert opinion, how appropriate would it be to include them going forwards? [Dialysis]
Q5a: The following conditions are not explicitly referenced in the UK characterisation of immunosuppression but appear in comparable national and international resources. In your expert opinion, how appropriate would it be to include them going forwards? [Cerebrospinal fluid leak]
Q5a: The following conditions are not explicitly referenced in the UK characterisation of immunosuppression but appear in comparable national and international resources. In your expert opinion, how appropriate would it be to include them going forwards? [Cochlear implant]
Q5a: The following conditions are not explicitly referenced in the UK characterisation of immunosuppression but appear in comparable national and international resources. In your expert opinion, how appropriate would it be to include them going forwards? [Burn injuries]
Q5a: The following conditions are not explicitly referenced in the UK characterisation of immunosuppression but appear in comparable national and international resources. In your expert opinion, how appropriate would it be to include them going forwards? [Pregnancy]
Q5a: The following conditions are not explicitly referenced in the UK characterisation of immunosuppression but appear in comparable national and international resources. In your expert opinion, how appropriate would it be to include them going forwards? [Chronic stress]
Q5a: The following conditions are not explicitly referenced in the UK characterisation of immunosuppression but appear in comparable national and international resources. In your expert opinion, how appropriate would it be to include them going forwards? [Sleep deprivation]
Q5a: The following conditions are not explicitly referenced in the UK characterisation of immunosuppression but appear in comparable national and international resources. In your expert opinion, how appropriate would it be to include them going forwards? [Malnutrition]
Q5a: The following conditions are not explicitly referenced in the UK characterisation of immunosuppression but appear in comparable national and international resources. In your expert opinion, how appropriate would it be to include them going forwards? [Stunting]
Q5a: The following conditions are not explicitly referenced in the UK characterisation of immunosuppression but appear in comparable national and international resources. In your expert opinion, how appropriate would it be to include them going forwards? [Anorexia Nervosa]
Q5b: Please justify your answers to Q5a, specifying if there were any areas where you were uncertain and why.
Q6a: The following conditions were put forward for inclusion in a comprehensive definition of immunosuppression by panellists in the previous round. In your expert opinion, how appropriate would it be to include them going forwards? [Cystic fibrosis]
Q6a: The following conditions were put forward for inclusion in a comprehensive definition of immunosuppression by panellists in the previous round. In your expert opinion, how appropriate would it be to include them going forwards? [Chronic Obstructive Pulmonary Disease]

Q6a: The following conditions were put forward for inclusion in a comprehensive definition of immunosuppression by panellists in the previous round. In your expert opinion, how appropriate would it be to include them going forwards? [Liver disease (including cirrhotic)]
Q6a: The following conditions were put forward for inclusion in a comprehensive definition of immunosuppression by panellists in the previous round. In your expert opinion, how appropriate would it be to include them going forwards? [Myalgic Encephalomyelitis/ Chronic Fatigue Syndrome]
Q6a: The following conditions were put forward for inclusion in a comprehensive definition of immunosuppression by panellists in the previous round. In your expert opinion, how appropriate would it be to include them going forwards? [Skin graft patients]
Q6a: The following conditions were put forward for inclusion in a comprehensive definition of immunosuppression by panellists in the previous round. In your expert opinion, how appropriate would it be to include them going forwards? [Obesity]
Q6a: The following conditions were put forward for inclusion in a comprehensive definition of immunosuppression by panellists in the previous round. In your expert opinion, how appropriate would it be to include them going forwards? [Preterm births]
Q6b: Please justify your answers to Q6a, specifying if there were any areas where you were uncertain and why.
Q7: Were there any conditions you were expecting to see that were not listed in either Q4, Q5 or Q6? If yes, please name them.
Q8a: To what extent do you agree with the following statements: 'A patient would not be considered immunosuppressed if...' [Their cancer is in remission]
Q8a: To what extent do you agree with the following statements: 'A patient would not be considered immunosuppressed if...' [Their cancer is currently untreated]
Q8a: To what extent do you agree with the following statements: 'A patient would not be considered immunosuppressed if...' [Their cancer is classed as Early Stage (Stage I)]
Q8a: To what extent do you agree with the following statements: 'A patient would not be considered immunosuppressed if...' [Their HIV is drug-managed]
Q8a: To what extent do you agree with the following statements: 'A patient would not be considered immunosuppressed if...' [Their inflammatory disease is currently untreated]
Q8a: To what extent do you agree with the following statements: 'A patient would not be considered immunosuppressed if...' [They have received immunosuppressive therapy for less than 6 months]
Q8a: To what extent do you agree with the following statements: 'A patient would not be considered immunosuppressed if...' [Their immunosuppressive regimen was discontinued more than 6 months ago]
Q8a: To what extent do you agree with the following statements: 'A patient would not be considered immunosuppressed if...' [Their immunosuppressive regimen was discontinued more than 1 year ago]
Q8a: To what extent do you agree with the following statements: 'A patient would not be considered immunosuppressed if...' [Their immunosuppressive regimen was discontinued more than 3 years ago]
Q8a: To what extent do you agree with the following statements: 'A patient would not be considered immunosuppressed if...' [They are on low-dose immunosuppressives (equivalent of < 20mg of prednisone per day)]
Q8a: To what extent do you agree with the following statements: 'A patient would not be considered immunosuppressed if...' [They are on very low-dose immunosuppressives (equivalent of < 10mg of prednisone per day)]
Q8b: Please justify your answers to Q8a, specifying if there were any areas where you were uncertain and why.
Q9a: Considering only the immunosuppressed spectrum, please specify whether you consider the following conditions at higher or lower risk for severe COVID-19 outcomes. [Solid organ transplantation]

Q9a: Considering only the immunosuppressed spectrum, please specify whether you consider the following conditions at higher or lower risk for severe COVID-19 outcomes. [Bone marrow transplantation]
Q9a: Considering only the immunosuppressed spectrum, please specify whether you consider the following conditions at higher or lower risk for severe COVID-19 outcomes. [Stem cell transplantation]
Q9a: Considering only the immunosuppressed spectrum, please specify whether you consider the following conditions at higher or lower risk for severe COVID-19 outcomes. [Multi-organ transplantation]
Q9a: Considering only the immunosuppressed spectrum, please specify whether you consider the following conditions at higher or lower risk for severe COVID-19 outcomes. [Islet transplantation]
Q9a: Considering only the immunosuppressed spectrum, please specify whether you consider the following conditions at higher or lower risk for severe COVID-19 outcomes. [Haematological malignancies]
Q9a: Considering only the immunosuppressed spectrum, please specify whether you consider the following conditions at higher or lower risk for severe COVID-19 outcomes. [Solid tumours]
Q9a: Considering only the immunosuppressed spectrum, please specify whether you consider the following conditions at higher or lower risk for severe COVID-19 outcomes. [Generalised malignancies (metastasis)]
Q9a: Considering only the immunosuppressed spectrum, please specify whether you consider the following conditions at higher or lower risk for severe COVID-19 outcomes. [Actively-treated malignancy]
Q9a: Considering only the immunosuppressed spectrum, please specify whether you consider the following conditions at higher or lower risk for severe COVID-19 outcomes. [HIV infection all stages]
Q9a: Considering only the immunosuppressed spectrum, please specify whether you consider the following conditions at higher or lower risk for severe COVID-19 outcomes. [Drug-managed HIV]
Q9a: Considering only the immunosuppressed spectrum, please specify whether you consider the following conditions at higher or lower risk for severe COVID-19 outcomes. [Untreated HIV]
Q9a: Considering only the immunosuppressed spectrum, please specify whether you consider the following conditions at higher or lower risk for severe COVID-19 outcomes. [AIDS-defining illness]
Q9a: Considering only the immunosuppressed spectrum, please specify whether you consider the following conditions at higher or lower risk for severe COVID-19 outcomes. [Genetic disorders affecting the immune system (e.g. SCID, complement disorder, IRAK-4, NEMO, inherited blood disorders)]
Q9a: Considering only the immunosuppressed spectrum, please specify whether you consider the following conditions at higher or lower risk for severe COVID-19 outcomes. [Down Syndrome]
Q9a: Considering only the immunosuppressed spectrum, please specify whether you consider the following conditions at higher or lower risk for severe COVID-19 outcomes. [Autoimmune skin diseases (e.g. Psoriasis, Dermatitis herpetiformis, Vitiligo, Pemphigus, Scleroderma, Dermatomyositis, etc.)]
Q9a: Considering only the immunosuppressed spectrum, please specify whether you consider the following conditions at higher or lower risk for severe COVID-19 outcomes. [Rheumatologic Disorders (e.g. Systemic lupus erythematosus, Rheumatoid Arthritis, Sjögren's syndrome, Idiopathic inflammatory myopathies, Ankylosing spondylitis, Vasculitides, Gout etc.)]
Q9a: Considering only the immunosuppressed spectrum, please specify whether you consider the following conditions at higher or lower risk for severe COVID-19 outcomes.

[Gastrointestinal Autoimmune Diseases (e.g. Inflammatory Bowel Syndrome, Celiac disease, Ulcerative colitis, Autoimmune hepatitis)]
Q9a: Considering only the immunosuppressed spectrum, please specify whether you consider the following conditions at higher or lower risk for severe COVID-19 outcomes. [Endocrine Autoimmune disorders (e.g. Type 1 diabetes mellitus, Hashimoto's thyroiditis, Graves' disease, Addison's disease etc.)]
Q9a: Considering only the immunosuppressed spectrum, please specify whether you consider the following conditions at higher or lower risk for severe COVID-19 outcomes. [Neurological Autoimmune Conditions (e.g. Multiple sclerosis, Myasthenia gravis, Autoimmune encephalitis, Guillain-Barré syndrome etc.)]
Q9a: Considering only the immunosuppressed spectrum, please specify whether you consider the following conditions at higher or lower risk for severe COVID-19 outcomes. [Hematological Autoimmune Disorders (e.g. Evan's syndrome, Immune thrombocytopenic purpura, Antiphospholipid syndrome, VEXAS etc.)]
Q9a: Considering only the immunosuppressed spectrum, please specify whether you consider the following conditions at higher or lower risk for severe COVID-19 outcomes. [Renal Autoimmune Diseases (e.g. Lupus nephritis, Glomerulonephritis, IgA nephropathy etc.)]
Q9a: Considering only the immunosuppressed spectrum, please specify whether you consider the following conditions at higher or lower risk for severe COVID-19 outcomes. [Opthalmologic autoimmune conditions (e.g. Uveitis, Graves' ophthalmopathy etc.)]
Q9a: Considering only the immunosuppressed spectrum, please specify whether you consider the following conditions at higher or lower risk for severe COVID-19 outcomes. [Underlying aberrant immunity (e.g. graft-vs-host disease, graft rejection, absent or incomplete immune reconstitution, neutropenia ANC, lymphopenia ALC)]
Q9a: Considering only the immunosuppressed spectrum, please specify whether you consider the following conditions at higher or lower risk for severe COVID-19 outcomes. [Type 2 diabetes mellitus]
Q9a: Considering only the immunosuppressed spectrum, please specify whether you consider the following conditions at higher or lower risk for severe COVID-19 outcomes. [Asplenia (anatomic/ functional)]
Q9a: Considering only the immunosuppressed spectrum, please specify whether you consider the following conditions at higher or lower risk for severe COVID-19 outcomes. [Aplastic anemia]
Q9a: Considering only the immunosuppressed spectrum, please specify whether you consider the following conditions at higher or lower risk for severe COVID-19 outcomes. [Sickle cell disease]
Q9a: Considering only the immunosuppressed spectrum, please specify whether you consider the following conditions at higher or lower risk for severe COVID-19 outcomes. [Chronic kidney disease]
Q9a: Considering only the immunosuppressed spectrum, please specify whether you consider the following conditions at higher or lower risk for severe COVID-19 outcomes. [Nephrotic syndrome]
Q9a: Considering only the immunosuppressed spectrum, please specify whether you consider the following conditions at higher or lower risk for severe COVID-19 outcomes. [Dialysis patients]
Q9a: Considering only the immunosuppressed spectrum, please specify whether you consider the following conditions at higher or lower risk for severe COVID-19 outcomes. [Cystic Fibrosis]
Q9a: Considering only the immunosuppressed spectrum, please specify whether you consider the following conditions at higher or lower risk for severe COVID-19 outcomes. [Chronic Obstructive Pulmonary Disease]
Q9a: Considering only the immunosuppressed spectrum, please specify whether you consider the following conditions at higher or lower risk for severe COVID-19 outcomes. [Liver disease (including cirrhotic)]

Q9a: Considering only the immunosuppressed spectrum, please specify whether you consider the following conditions at higher or lower risk for severe COVID-19 outcomes. [Cerebrospinal fluid leak]
Q9a: Considering only the immunosuppressed spectrum, please specify whether you consider the following conditions at higher or lower risk for severe COVID-19 outcomes. [Cochlear implant]
Q9a: Considering only the immunosuppressed spectrum, please specify whether you consider the following conditions at higher or lower risk for severe COVID-19 outcomes. [Burn injuries]
Q9a: Considering only the immunosuppressed spectrum, please specify whether you consider the following conditions at higher or lower risk for severe COVID-19 outcomes. [Skin graft recipients]
Q9a: Considering only the immunosuppressed spectrum, please specify whether you consider the following conditions at higher or lower risk for severe COVID-19 outcomes. [Pregnancy]
Q9a: Considering only the immunosuppressed spectrum, please specify whether you consider the following conditions at higher or lower risk for severe COVID-19 outcomes. [Preterm births]
Q9a: Considering only the immunosuppressed spectrum, please specify whether you consider the following conditions at higher or lower risk for severe COVID-19 outcomes. [Chronic stress]
Q9a: Considering only the immunosuppressed spectrum, please specify whether you consider the following conditions at higher or lower risk for severe COVID-19 outcomes. [Sleep deprivation]
Q9a: Considering only the immunosuppressed spectrum, please specify whether you consider the following conditions at higher or lower risk for severe COVID-19 outcomes. [Malnutrition]
Q9a: Considering only the immunosuppressed spectrum, please specify whether you consider the following conditions at higher or lower risk for severe COVID-19 outcomes. [Stunting]
Q9a: Considering only the immunosuppressed spectrum, please specify whether you consider the following conditions at higher or lower risk for severe COVID-19 outcomes. [Obesity]
Q9a: Considering only the immunosuppressed spectrum, please specify whether you consider the following conditions at higher or lower risk for severe COVID-19 outcomes. [Anorexia Nervosa]
Q9a: Considering only the immunosuppressed spectrum, please specify whether you consider the following conditions at higher or lower risk for severe COVID-19 outcomes. [Myalgic Encephalomyelitis/ Chronic Fatigue Syndrome]
Q9b: Please justify your answers to Q9a, specifying if there were any areas where you were uncertain and why.
Q10a: Please specify how vulnerable you believe the following conditions are to severe COVID-19 outcomes compared to the immunocompetent baseline. [Solid organ transplantation]
Q10a: Please specify how vulnerable you believe the following conditions are to severe COVID-19 outcomes compared to the immunocompetent baseline. [Bone marrow transplantation]
Q10a: Please specify how vulnerable you believe the following conditions are to severe COVID-19 outcomes compared to the immunocompetent baseline. [Stem cell transplantation]
Q10a: Please specify how vulnerable you believe the following conditions are to severe COVID-19 outcomes compared to the immunocompetent baseline. [Multi-organ transplantation]
Q10a: Please specify how vulnerable you believe the following conditions are to severe COVID-19 outcomes compared to the immunocompetent baseline. [Islet transplantation]

Q10a: Please specify how vulnerable you believe the following conditions are to severe COVID-19 outcomes compared to the immunocompetent baseline. [Haematological malignancies]
Q10a: Please specify how vulnerable you believe the following conditions are to severe COVID-19 outcomes compared to the immunocompetent baseline. [Solid tumours]
Q10a: Please specify how vulnerable you believe the following conditions are to severe COVID-19 outcomes compared to the immunocompetent baseline. [Generalised malignancies (metastasis)]
Q10a: Please specify how vulnerable you believe the following conditions are to severe COVID-19 outcomes compared to the immunocompetent baseline. [Actively-treated malignancy]
Q10a: Please specify how vulnerable you believe the following conditions are to severe COVID-19 outcomes compared to the immunocompetent baseline. [HIV infection all stages]
Q10a: Please specify how vulnerable you believe the following conditions are to severe COVID-19 outcomes compared to the immunocompetent baseline. [Drug-managed HIV]
Q10a: Please specify how vulnerable you believe the following conditions are to severe COVID-19 outcomes compared to the immunocompetent baseline. [Untreated HIV]
Q10a: Please specify how vulnerable you believe the following conditions are to severe COVID-19 outcomes compared to the immunocompetent baseline. [AIDS-defining illness]
Q10a: Please specify how vulnerable you believe the following conditions are to severe COVID-19 outcomes compared to the immunocompetent baseline. [Genetic disorders affecting the immune system (e.g. SCID, complement disorder, IRAK-4, NEMO, inherited blood disorders)]
Q10a: Please specify how vulnerable you believe the following conditions are to severe COVID-19 outcomes compared to the immunocompetent baseline. [Down Syndrome]
Q10a: Please specify how vulnerable you believe the following conditions are to severe COVID-19 outcomes compared to the immunocompetent baseline. [Autoimmune skin diseases (e.g. Psoriasis, Dermatitis herpetiformis, Vitiligo, Pemphigus, Scleroderma, Dermatomyositis etc.)]
Q10a: Please specify how vulnerable you believe the following conditions are to severe COVID-19 outcomes compared to the immunocompetent baseline. [Rheumatologic Disorders (e.g. Systemic lupus erythematosus, Rheumatoid Arthritis, Sjögren's syndrome, Idiopathic inflammatory myopathies, Ankylosing spondylitis, Vasculitides, Gout etc.)]
Q10a: Please specify how vulnerable you believe the following conditions are to severe COVID-19 outcomes compared to the immunocompetent baseline. [Gastrointestinal Autoimmune Diseases (e.g. Inflammatory Bowel Syndrome, Celiac disease, Ulcerative colitis, Autoimmune hepatitis)]
Q10a: Please specify how vulnerable you believe the following conditions are to severe COVID-19 outcomes compared to the immunocompetent baseline. [Endocrine Autoimmune disorders (e.g. Type 1 diabetes mellitus, Hashimoto’s thyroiditis, Graves' disease, Addison’s disease etc.)]
Q10a: Please specify how vulnerable you believe the following conditions are to severe COVID-19 outcomes compared to the immunocompetent baseline. [Neurological Autoimmune Conditions (e.g. Multiple sclerosis, Myasthenia gravis, Autoimmune encephalitis, Guillain-Barré syndrome etc.)]
Q10a: Please specify how vulnerable you believe the following conditions are to severe COVID-19 outcomes compared to the immunocompetent baseline. [Hematological Autoimmune Disorders (e.g. Evan’s syndrome, Immune thrombocytopenic purpura, Antiphospholipid syndrome, VEXAS etc.)]
Q10a: Please specify how vulnerable you believe the following conditions are to severe COVID-19 outcomes compared to the immunocompetent baseline. [Renal Autoimmune Diseases (e.g. Lupus nephritis, Glomerulonephritis, IgA nephropathy etc.)]

Q10a: Please specify how vulnerable you believe the following conditions are to severe COVID-19 outcomes compared to the immunocompetent baseline. [Opthalmologic autoimmune conditions (e.g. Uveitis, Graves' ophthalmopathy etc.)]
Q10a: Please specify how vulnerable you believe the following conditions are to severe COVID-19 outcomes compared to the immunocompetent baseline. [Underlying aberrant immunity (e.g. graft-vs-host disease, graft rejection, absent or incomplete immune reconstitution, neutropenia ANC, lymphopenia ALC)]
Q10a: Please specify how vulnerable you believe the following conditions are to severe COVID-19 outcomes compared to the immunocompetent baseline. [Type 2 diabetes mellitus]
Q10a: Please specify how vulnerable you believe the following conditions are to severe COVID-19 outcomes compared to the immunocompetent baseline. [Asplenia (anatomic/ functional)]
Q10a: Please specify how vulnerable you believe the following conditions are to severe COVID-19 outcomes compared to the immunocompetent baseline. [Aplastic anemia]
Q10a: Please specify how vulnerable you believe the following conditions are to severe COVID-19 outcomes compared to the immunocompetent baseline. [Sickle cell disease]
Q10a: Please specify how vulnerable you believe the following conditions are to severe COVID-19 outcomes compared to the immunocompetent baseline. [Chronic kidney disease]
Q10a: Please specify how vulnerable you believe the following conditions are to severe COVID-19 outcomes compared to the immunocompetent baseline. [Nephrotic syndrome]
Q10a: Please specify how vulnerable you believe the following conditions are to severe COVID-19 outcomes compared to the immunocompetent baseline. [Dialysis patients]
Q10a: Please specify how vulnerable you believe the following conditions are to severe COVID-19 outcomes compared to the immunocompetent baseline. [Cystic fibrosis]
Q10a: Please specify how vulnerable you believe the following conditions are to severe COVID-19 outcomes compared to the immunocompetent baseline. [Chronic Obstructive Pulmonary Disease]
Q10a: Please specify how vulnerable you believe the following conditions are to severe COVID-19 outcomes compared to the immunocompetent baseline. [Liver disease (including cirrhotic)]
Q10a: Please specify how vulnerable you believe the following conditions are to severe COVID-19 outcomes compared to the immunocompetent baseline. [Cerebrospinal fluid leak]
Q10a: Please specify how vulnerable you believe the following conditions are to severe COVID-19 outcomes compared to the immunocompetent baseline. [Cochlear implant]
Q10a: Please specify how vulnerable you believe the following conditions are to severe COVID-19 outcomes compared to the immunocompetent baseline. [Burn injuries]
Q10a: Please specify how vulnerable you believe the following conditions are to severe COVID-19 outcomes compared to the immunocompetent baseline. [Skin graft recipients]
Q10a: Please specify how vulnerable you believe the following conditions are to severe COVID-19 outcomes compared to the immunocompetent baseline. [Pregnancy]
Q10a: Please specify how vulnerable you believe the following conditions are to severe COVID-19 outcomes compared to the immunocompetent baseline. [Preterm births]
Q10a: Please specify how vulnerable you believe the following conditions are to severe COVID-19 outcomes compared to the immunocompetent baseline. [Chronic stress]
Q10a: Please specify how vulnerable you believe the following conditions are to severe COVID-19 outcomes compared to the immunocompetent baseline. [Sleep deprivation]
Q10a: Please specify how vulnerable you believe the following conditions are to severe COVID-19 outcomes compared to the immunocompetent baseline. [Malnutrition]
Q10a: Please specify how vulnerable you believe the following conditions are to severe COVID-19 outcomes compared to the immunocompetent baseline. [Stunting]
Q10a: Please specify how vulnerable you believe the following conditions are to severe COVID-19 outcomes compared to the immunocompetent baseline. [Obesity]

Q10a: Please specify how vulnerable you believe the following conditions are to severe COVID-19 outcomes compared to the immunocompetent baseline. [Anorexia Nervosa]
Q10a: Please specify how vulnerable you believe the following conditions are to severe COVID-19 outcomes compared to the immunocompetent baseline. [Myalgic Encephalomyelitis/ Chronic Fatigue Syndrome]
Q10b: Please justify your answers to Q10a, specifying if there were any areas where you were uncertain and why.

Data Collection prior to Final Discussion, n = 29

- *For those set to attend final discussion groups in-person; 1 panellist that participated in final discussion did not return this intake form.*
- *Evaluation of second drafts of phenotypes (Risk-Categorised and Risk-Stratified).*
- *Assessment of clinical consensus statements panel had yet to reach agreement on.*

Please enter your Panellist ID number.
1a. To what extent to you agree with the following descriptions of the draft COVID-19 Risk Categorised Phenotype for Adult Immunosuppression (Phenotype 1)? For your convenience, please reference the the the draft phenotypes document linked while answering this question. [This version is an improvement to the last draft]
1a. To what extent to you agree with the following descriptions of the draft COVID-19 Risk Categorised Phenotype for Adult Immunosuppression (Phenotype 1)? For your convenience, please reference the the the draft phenotypes document linked while answering this question. [I prefer the three-part categorisation to the previous two-part categorisation]
1a. To what extent to you agree with the following descriptions of the draft COVID-19 Risk Categorised Phenotype for Adult Immunosuppression (Phenotype 1)? For your convenience, please reference the the the draft phenotypes document linked while answering this question. [Drug-managed HIV is a fair active control group for this phenotype]
1a. To what extent to you agree with the following descriptions of the draft COVID-19 Risk Categorised Phenotype for Adult Immunosuppression (Phenotype 1)? For your convenience, please reference the the the draft phenotypes document linked while answering this question. [It would be useful to compare phenotype COVID-19 outcomes to those of this active control group]
1a. To what extent to you agree with the following descriptions of the draft COVID-19 Risk Categorised Phenotype for Adult Immunosuppression (Phenotype 1)? For your convenience, please reference the the the draft phenotypes document linked while answering this question. [This phenotype is an accurate representation of results from the last round]
1a. To what extent to you agree with the following descriptions of the draft COVID-19 Risk Categorised Phenotype for Adult Immunosuppression (Phenotype 1)? For your convenience, please reference the the the draft phenotypes document linked while answering this question. [In reference to the immunosuppressed spectrum, this phenotype correctly allocates conditions into High Risk vs Moderate Risk vs Low Risk for severe COVID-19 outcomes]
1a. To what extent to you agree with the following descriptions of the draft COVID-19 Risk Categorised Phenotype for Adult Immunosuppression (Phenotype 1)? For your convenience, please reference the the the draft phenotypes document linked while

answering this question. [This phenotype represents a step forward for subdividing immunosuppressed COVID infection outcomes]
1a. To what extent to you agree with the following descriptions of the draft COVID-19 Risk Categorised Phenotype for Adult Immunosuppression (Phenotype 1)? For your convenience, please reference the the the draft phenotypes document linked while answering this question. [It would be useful to apply this phenotype to subdivide immunosuppressed outcomes for other diseases (seasonal influenza, pneumonia, RSV etc.)]
Q1b: Please justify your answers to Q1a, specifying if there were any areas where you were uncertain and why.
2a. To what extent to you agree with the following descriptions of the draft COVID-19 Risk Stratified Phenotype for Adult Immunosuppression (Phenotype 2)? For your convenience, please reference the the the draft phenotypes document linked while answering this question. [This version is an improvement to the last draft]
2a. To what extent to you agree with the following descriptions of the draft COVID-19 Risk Stratified Phenotype for Adult Immunosuppression (Phenotype 2)? For your convenience, please reference the the the draft phenotypes document linked while answering this question. [This phenotype is an accurate representation of results from the last round]
2a. To what extent to you agree with the following descriptions of the draft COVID-19 Risk Stratified Phenotype for Adult Immunosuppression (Phenotype 2)? For your convenience, please reference the the the draft phenotypes document linked while answering this question. [Drug-managed HIV is a fair active control group for this phenotype]
2a. To what extent to you agree with the following descriptions of the draft COVID-19 Risk Stratified Phenotype for Adult Immunosuppression (Phenotype 2)? For your convenience, please reference the the the draft phenotypes document linked while answering this question. [It would be useful to compare phenotype COVID-19 outcomes to those of this active control group]
2a. To what extent to you agree with the following descriptions of the draft COVID-19 Risk Stratified Phenotype for Adult Immunosuppression (Phenotype 2)? For your convenience, please reference the the the draft phenotypes document linked while answering this question. [The levels of this phenotype are presented in the correct order (descending levels of risk for severe COVID-19 outcomes)]
2a. To what extent to you agree with the following descriptions of the draft COVID-19 Risk Stratified Phenotype for Adult Immunosuppression (Phenotype 2)? For your convenience, please reference the the the draft phenotypes document linked while answering this question. [Conditions are correctly allocated to phenotype levels]
2a. To what extent to you agree with the following descriptions of the draft COVID-19 Risk Stratified Phenotype for Adult Immunosuppression (Phenotype 2)? For your convenience, please reference the the the draft phenotypes document linked while answering this question. [This phenotype represents a step forward for subdividing immunosuppressed COVID-19 infection outcomes]
2a. To what extent to you agree with the following descriptions of the draft COVID-19 Risk Stratified Phenotype for Adult Immunosuppression (Phenotype 2)? For your convenience, please reference the the the draft phenotypes document linked while answering this question. [It would be useful to apply this phenotype to subdivide immunosuppressed outcomes for other diseases (seasonal influenza, pneumonia, RSV etc.)]
Q2b: Please justify your answers to Q2a, specifying if there were any areas where you were uncertain and why.
Q3a: To what extent do you agree with the following statements? [Our current clinical definition for immunosuppression is too expansive]
Q3a: To what extent do you agree with the following statements? [Our current clinical definition for immunosuppression is not expansive enough]
Q3a: To what extent do you agree with the following statements? [The terms 'immunosuppression' and 'immunocompromised' can be used interchangeably]

Q3a: To what extent do you agree with the following statements? [The needs of the immunosuppressed are sufficiently prioritised in times of public health emergency]
Q3a: To what extent do you agree with the following statements? [It is easy to pick out the immunosuppressed subgroups at most risk for COVID-19]
Q3a: To what extent do you agree with the following statements? [The immunosuppressed subgroups that are at the most risk for COVID-19 are the same subgroups at most risk for other infectious diseases (RSV, influenza, bacterial pneumonia etc.)]
Q3a: To what extent do you agree with the following statements? [COVID care for the immunosuppressed – including vaccination and the release of antivirals and other resources – is overly one size fits all]
3b. Please justify your answers to Q3a, specifying if there were any areas where you were uncertain and why.
Q4a: To what extent do you agree with the following statements: 'A patient would not be considered immunosuppressed if...' [The patient's cancer is in remission]
Q4a: To what extent do you agree with the following statements: 'A patient would not be considered immunosuppressed if...' [The patient's cancer is current untreated]
Q4a: To what extent do you agree with the following statements: 'A patient would not be considered immunosuppressed if...' [The patient's cancer is classed as early stage (I)]
Q4a: To what extent do you agree with the following statements: 'A patient would not be considered immunosuppressed if...' [The patient's inflammatory disease is currently untreated]
Q4a: To what extent do you agree with the following statements: 'A patient would not be considered immunosuppressed if...' [The patient's immunosuppressive regimen was discontinued more than 6 months ago]
Q4a: To what extent do you agree with the following statements: 'A patient would not be considered immunosuppressed if...' [The patient's immunosuppressive regimen was discontinued more than 12 months ago]
Q4a: To what extent do you agree with the following statements: 'A patient would not be considered immunosuppressed if...' [The patient is on low-dose immunosuppressives (equivalent of ≤20mg of prednisone per day)]
Q4a: To what extent do you agree with the following statements: 'A patient would not be considered immunosuppressed if...' [The patient is on very low-dose immunosuppressives (equivalent of ≤10mg of prednisone per day)]
Q4b: Please justify your answers to Q4a, specifying if there were any areas where you were uncertain and why.

Written participation in Final Discussion Group, n = 10

- *For those unable to join final discussion groups in-person.*
- *Evaluation of second drafts of phenotypes (Risk-Categorised and Risk-Stratified).*
- *Assessment of clinical consensus statements panel had yet to reach agreement on.*
- *Feedback on strengths and weaknesses of study.*
- *Recommendations of possible topics affecting immunosuppressed patient care for DESTINIES panel to build consensus on in future.*

Please enter your Panellist ID number.
1a. To what extent to you agree with the following descriptions of the draft COVID-19 Risk Categorised Phenotype for Adult Immunosuppression (Phenotype 1)? For your convenience, please reference the the the draft phenotypes document linked while answering this question. [This version is an improvement to the last draft]
1a. To what extent to you agree with the following descriptions of the draft COVID-19 Risk Categorised Phenotype for Adult Immunosuppression (Phenotype 1)? For your convenience, please reference the the the draft phenotypes document linked while answering this question. [I prefer the three-part categorisation to the previous two-part categorisation]
1a. To what extent to you agree with the following descriptions of the draft COVID-19 Risk Categorised Phenotype for Adult Immunosuppression (Phenotype 1)? For your convenience, please reference the the the draft phenotypes document linked while answering this question. [Drug-managed HIV is a fair active control group for this phenotype]
1a. To what extent to you agree with the following descriptions of the draft COVID-19 Risk Categorised Phenotype for Adult Immunosuppression (Phenotype 1)? For your convenience, please reference the the the draft phenotypes document linked while answering this question. [It would be useful to compare phenotype COVID-19 outcomes to those of this active control group]
1a. To what extent to you agree with the following descriptions of the draft COVID-19 Risk Categorised Phenotype for Adult Immunosuppression (Phenotype 1)? For your convenience, please reference the the the draft phenotypes document linked while answering this question. [This phenotype is an accurate representation of results from the last round]
1a. To what extent to you agree with the following descriptions of the draft COVID-19 Risk Categorised Phenotype for Adult Immunosuppression (Phenotype 1)? For your convenience, please reference the the the draft phenotypes document linked while answering this question. [In reference to the immunosuppressed spectrum, this phenotype correctly allocates conditions into High Risk vs Moderate Risk vs Low Risk for severe COVID-19 outcomes]
1a. To what extent to you agree with the following descriptions of the draft COVID-19 Risk Categorised Phenotype for Adult Immunosuppression (Phenotype 1)? For your convenience, please reference the the the draft phenotypes document linked while answering this question. [This phenotype represents a step forward for subdividing immunosuppressed COVID infection outcomes]
1a. To what extent to you agree with the following descriptions of the draft COVID-19 Risk Categorised Phenotype for Adult Immunosuppression (Phenotype 1)? For your convenience, please reference the the the draft phenotypes document linked while answering this question. [It would be useful to apply this phenotype to subdivide immunosuppressed outcomes for other diseases (seasonal influenza, pneumonia, RSV etc.)]
Q1b: Please justify your answers to Q1a, specifying if there were any areas where you were uncertain and why.
2a. To what extent to you agree with the following descriptions of the draft COVID-19 Risk Stratified Phenotype for Adult Immunosuppression (Phenotype 2)? For your convenience, please reference the the the draft phenotypes document linked while answering this question. [This version is an improvement to the last draft]
2a. To what extent to you agree with the following descriptions of the draft COVID-19 Risk Stratified Phenotype for Adult Immunosuppression (Phenotype 2)? For your convenience, please reference the the the draft phenotypes document linked while answering this question. [This phenotype is an accurate representation of results from the last round]
2a. To what extent to you agree with the following descriptions of the draft COVID-19 Risk Stratified Phenotype for Adult Immunosuppression (Phenotype 2)? For your convenience,

please reference the the the draft phenotypes document linked while answering this question. [Drug-managed HIV is a fair active control group for this phenotype]
2a. To what extent to you agree with the following descriptions of the draft COVID-19 Risk Stratified Phenotype for Adult Immunosuppression (Phenotype 2)? For your convenience, please reference the the the draft phenotypes document linked while answering this question. [It would be useful to compare phenotype COVID-19 outcomes to those of this active control group]
2a. To what extent to you agree with the following descriptions of the draft COVID-19 Risk Stratified Phenotype for Adult Immunosuppression (Phenotype 2)? For your convenience, please reference the the the draft phenotypes document linked while answering this question. [The levels of this phenotype are presented in the correct order (descending levels of risk for severe COVID-19 outcomes)]
2a. To what extent to you agree with the following descriptions of the draft COVID-19 Risk Stratified Phenotype for Adult Immunosuppression (Phenotype 2)? For your convenience, please reference the the the draft phenotypes document linked while answering this question. [Conditions are correctly allocated to phenotype levels]
2a. To what extent to you agree with the following descriptions of the draft COVID-19 Risk Stratified Phenotype for Adult Immunosuppression (Phenotype 2)? For your convenience, please reference the the the draft phenotypes document linked while answering this question. [This phenotype represents a step forward for subdividing immunosuppressed COVID-19 infection outcomes]
2a. To what extent to you agree with the following descriptions of the draft COVID-19 Risk Stratified Phenotype for Adult Immunosuppression (Phenotype 2)? For your convenience, please reference the the the draft phenotypes document linked while answering this question. [It would be useful to apply this phenotype to subdivide immunosuppressed outcomes for other diseases (seasonal influenza, pneumonia, RSV etc.)]
Q2b: Please justify your answers to Q2a, specifying if there were any areas where you were uncertain and why.
Q3a: To what extent do you agree with the following statements? [Our current clinical definition for immunosuppression is too expansive]
Q3a: To what extent do you agree with the following statements? [Our current clinical definition for immunosuppression is not expansive enough]
Q3a: To what extent do you agree with the following statements? [The terms 'immunosuppression' and 'immunocompromised' can be used interchangeably]
Q3a: To what extent do you agree with the following statements? [The needs of the immunosuppressed are sufficiently prioritised in times of public health emergency]
Q3a: To what extent do you agree with the following statements? [It is easy to pick out the immunosuppressed subgroups at most risk for COVID-19]
Q3a: To what extent do you agree with the following statements? [The immunosuppressed subgroups that are at the most risk for COVID-19 are the same subgroups at most risk for other infectious diseases (RSV, influenza, bacterial pneumonia etc.)]
Q3a: To what extent do you agree with the following statements? [COVID care for the immunosuppressed – including vaccination and the release of antivirals and other resources – is overly one size fits all]
3b. Please justify your answers to Q3a, specifying if there were any areas where you were uncertain and why.
Q4a: To what extent do you agree with the following statements: 'A patient would not be considered immunosuppressed if…' [The patient's cancer is in remission]
Q4a: To what extent do you agree with the following statements: 'A patient would not be considered immunosuppressed if…' [The patient's cancer is current untreated]

Q4a: To what extent do you agree with the following statements: 'A patient would not be considered immunosuppressed if...' [The patient's cancer is classed as early stage (I)]
Q4a: To what extent do you agree with the following statements: 'A patient would not be considered immunosuppressed if...' [The patient's inflammatory disease is currently untreated]
Q4a: To what extent do you agree with the following statements: 'A patient would not be considered immunosuppressed if...' [The patient's immunosuppressive regimen was discontinued more than 6 months ago]
Q4a: To what extent do you agree with the following statements: 'A patient would not be considered immunosuppressed if...' [The patient's immunosuppressive regimen was discontinued more than 12 months ago]
Q4a: To what extent do you agree with the following statements: 'A patient would not be considered immunosuppressed if...' [The patient is on low-dose immunosuppressives (equivalent of ≤20mg of prednisone per day)]
Q4a: To what extent do you agree with the following statements: 'A patient would not be considered immunosuppressed if...' [The patient is on very low-dose immunosuppressives (equivalent of ≤10mg of prednisone per day)]
Q4b: Please justify your answers to Q4a, specifying if there were any areas where you were uncertain and why.
Q5a: To what extent do you agree with the following statements? [I have enjoyed participating in the DESTINIES Study]
Q5a: To what extent do you agree with the following statements? [I would recommend that members of my professional network consider joining the DESTINIES Consortium to conduct further consensus building exercises on issues affecting immunosuppressed patients]
Q5a: To what extent do you agree with the following statements? [I am looking forward to seeing the insights of this exercise implemented in real-world research and policymaking]
Q5a: To what extent do you agree with the following statements? [I would be willing to contribute to additional consensus building exercises as a DESTINIES Consortium member]
Q5a: To what extent do you agree with the following statements? [I would be willing to assess whether the outputs of these digital phenotypes in real-world data are clinically meaningful]
Q5b: Please justify your answers to 5a, specifying if there were any areas where you were uncertain and why.
Q6: List the strengths of this exercise as you see them; please provide as much detail as possible.
Q7: List the limitations of this exercise as you see them; please provide as much detail as possible.
Q8: Are there any other issues affecting immunosuppressed patients that would benefit from a similar consensus building exercise? If yes, please list them.

Final ratification of DESTINIES phenotype, n = 33

- *Evaluation of DESTINIES phenotype.*
- *Feedback on strengths and weaknesses of study.*

- *Recommendations of possible topics affecting immunosuppressed patient care for DESTINIES panel to build consensus on in future.*

Please enter your Panellist ID number.
1a. To what extent do you agree with the following statements regarding the DESTINIES phenotype? You can find this phenotype on the The final phenotype document; it is provided under the title 'The DESTINIES Phenotype: ‘Adult immunosuppression, classified by COVID-19 vulnerability’. [I am happy with this phenotype being trialled within real-world data flows]
1a. To what extent do you agree with the following statements regarding the DESTINIES phenotype? You can find this phenotype on the The final phenotype document; it is provided under the title 'The DESTINIES Phenotype: ‘Adult immunosuppression, classified by COVID-19 vulnerability’. [This phenotype is an accurate representation of results from the last round]
1a. To what extent do you agree with the following statements regarding the DESTINIES phenotype? You can find this phenotype on the The final phenotype document; it is provided under the title 'The DESTINIES Phenotype: ‘Adult immunosuppression, classified by COVID-19 vulnerability’. [This version is an improvement to the last draft]
1a. To what extent do you agree with the following statements regarding the DESTINIES phenotype? You can find this phenotype on the The final phenotype document; it is provided under the title 'The DESTINIES Phenotype: ‘Adult immunosuppression, classified by COVID-19 vulnerability’. [I prefer the banded version of this phenotype]
1a. To what extent do you agree with the following statements regarding the DESTINIES phenotype? You can find this phenotype on the The final phenotype document; it is provided under the title 'The DESTINIES Phenotype: ‘Adult immunosuppression, classified by COVID-19 vulnerability’. [The risk-banding of this phenotype includes the correct levels]
1a. To what extent do you agree with the following statements regarding the DESTINIES phenotype? You can find this phenotype on the The final phenotype document; it is provided under the title 'The DESTINIES Phenotype: ‘Adult immunosuppression, classified by COVID-19 vulnerability’. [The levels of this phenotype are presented in the correct order (descending levels of risk for severe COVID-19 outcomes)]
1a. To what extent do you agree with the following statements regarding the DESTINIES phenotype? You can find this phenotype on the The final phenotype document; it is provided under the title 'The DESTINIES Phenotype: ‘Adult immunosuppression, classified by COVID-19 vulnerability’. [Conditions are correctly allocated to phenotype levels]
1a. To what extent do you agree with the following statements regarding the DESTINIES phenotype? You can find this phenotype on the The final phenotype document; it is provided under the title 'The DESTINIES Phenotype: ‘Adult immunosuppression, classified by COVID-19 vulnerability’. [Drug-managed HIV is a fair internal reference group for this phenotype]
1a. To what extent do you agree with the following statements regarding the DESTINIES phenotype? You can find this phenotype on the The final phenotype document; it is provided under the title 'The DESTINIES Phenotype: ‘Adult immunosuppression, classified by COVID-19 vulnerability’. [It would be useful to compare phenotype COVID-19 outcomes to those of the internal reference group and general population control group]
1a. To what extent do you agree with the following statements regarding the DESTINIES phenotype? You can find this phenotype on the The final phenotype document; it is provided under the title 'The DESTINIES Phenotype: ‘Adult immunosuppression, classified by COVID-19 vulnerability’. [This phenotype represents a step forward for subdividing immunosuppressed COVID-19 infection outcomes in surveillance data flows]
1a. To what extent do you agree with the following statements regarding the DESTINIES phenotype? You can find this phenotype on the The final phenotype document; it is

provided under the title 'The DESTINIES Phenotype: ‘Adult immunosuppression, classified by COVID-19 vulnerability’. [As a hypothesis generating exercise, it would be interesting to apply this phenotype to subdivide immunosuppressed outcomes for other diseases (seasonal influenza, pneumonia, RSV etc.)]
Q1b: Please justify your answers to Q1a, specifying if there were any areas where you were uncertain and why.
Q2: List the strengths of this exercise as you see them; please provide as much detail as possible. Please write 'NA' if you addressed this question in Final Discussion.
Q3: List the limitations of this exercise as you see them; please provide as much detail as possible. Please write 'NA' if you addressed this question in Final Discussion.
Q4: Are there any other issues affecting immunosuppressed patients that would benefit from a similar consensus building exercise? If yes, please list them. Please write 'NA' if you addressed this question in Final Discussion.

Appendix 13: DESTINIES panel participation by study round

Delphi Round	n
Round 1	64
Round 2	60
Final Discussion	40
Panel Ratification	34

Appendix 14: Round-by-round interim data

Round 1 Interim Data

Appropriateness for inclusion in a phenotype of 'adult immunosuppression' data

Diagnosis	Not appropriate	%	Somewhat inappropriate	%	Unsure	%	Somewhat appropriate	%	Appropriate	%	SUM disagree	SUM agree	Determination
Multi-organ transplantation	0	0.00	2	3.13	1	1.56	2	3.13	59	92.19	3.13	95.31	Appropriate
Islet transplantation	2	3.13	1	1.56	18	28.13	17	26.56	26	40.63	4.69	67.19	Contested
Solid tumours	0	0.00	5	7.81	10	15.63	25	39.06	24	37.50	7.81	76.56	Appropriate
Generalised malignancies (metastasis)	1	1.56	4	6.25	10	15.63	18	28.13	31	48.44	7.81	76.56	Appropriate
Drug-managed HIV	18	28.13	12	18.75	13	20.31	14	21.88	7	10.94	46.88	32.81	Contested
Untreated HIV	4	6.25	1	1.56	5	7.81	14	21.88	40	62.50	7.81	84.38	Appropriate
AIDS	0	0.00	0	0.00	2	3.13	7	10.94	55	85.94	0.00	96.88	Appropriate
Down Syndrome	2	3.13	7	10.94	18	28.13	23	35.94	14	21.88	14.06	57.81	Contested
Autoimmune skin diseases	5	7.81	14	21.88	18	28.13	22	34.38	5	7.81	29.69	42.19	Contested
Rheumatologic disorders	3	4.69	11	17.19	14	21.88	28	43.75	8	12.50	21.88	56.25	Contested

Gastrointestinal autoimmune disorders	2	3.13	13	20.31	19	29.69	25	39.06	5	7.81	23.44	46.88	Contested
Endocrine autoimmune disorders	9	14.06	17	26.56	18	28.13	16	25.00	4	6.25	40.63	31.25	Contested
Neurologic autoimmune disorders	1	1.56	14	21.88	15	23.44	23	35.94	11	17.19	23.44	53.13	Contested
Hematologic autoimmune disorders	2	3.13	17	26.56	16	25.00	20	31.25	9	14.06	29.69	45.31	Contested
Renal autoimmune disorders	2	3.13	14	21.88	8	12.50	25	39.06	15	23.44	25.00	62.50	Contested
Opthalmologic autoimmune disorders	6	9.38	18	28.13	21	32.81	16	25.00	3	4.69	37.50	29.69	Contested
Underlying aberrant immunity	1	1.56	1	1.56	2	3.13	21	32.81	39	60.94	3.13	93.75	Appropriate
Type 2 Diabetes	10	15.63	17	26.56	13	20.31	19	29.69	5	7.81	42.19	37.50	Contested
Asplenia	6	9.38	5	7.81	8	12.50	18	28.13	27	42.19	17.19	70.31	Contested
Aplastic anemia	2	3.13	9	14.06	11	17.19	18	28.13	24	37.50	17.19	65.63	Contested
Sickle cell disease	5	7.81	13	20.31	16	25.00	15	23.44	15	23.44	28.13	46.88	Contested
Chronic kidney disease	4	6.25	10	15.63	5	7.81	33	51.56	12	18.75	21.88	70.31	Contested
Nephrotic disease	4	6.25	12	18.75	10	15.63	27	42.19	11	17.19	25.00	59.38	Contested
Dialysis	2	3.13	6	9.38	10	15.63	23	35.94	23	35.94	12.50	71.88	Contested

Cerebrospinal fluid leak	11	17.19	14	21.88	18	28.13	11	17.19	10	15.63	39.06	32.81	Contested
Cochlear implant	20	31.25	10	15.63	20	31.25	8	12.50	6	9.38	46.88	21.88	Contested
Burn injuries	13	20.31	11	17.19	12	18.75	20	31.25	8	12.50	37.50	43.75	Contested
Pregnancy	15	23.44	10	15.63	9	14.06	23	35.94	7	10.94	39.06	46.88	Contested
Chronic stress	29	45.31	19	29.69	13	20.31	3	4.69	0	0.00	75.00	4.69	Inappropriate
Sleep deprivation	31	48.44	17	26.56	14	21.88	2	3.13	0	0.00	75.00	3.13	Inappropriate
Malnutrition	10	15.63	8	12.50	19	29.69	17	26.56	10	15.63	28.13	42.19	Contested
Stunting	17	26.56	14	21.88	25	39.06	7	10.94	1	1.56	48.44	12.50	Contested
Anorexia	13	20.31	13	20.31	19	29.69	14	21.88	5	7.81	40.63	29.69	Contested
SOT	0	0.00	1	1.56	0	0.00	2	3.13	61	95.31	1.56	98.44	Appropriate
Bone marrow transplantation	0	0.00	0	0.00	1	1.56	7	10.94	56	87.50	0.00	98.44	Appropriate
Stem cell transplantation	0	0.00	1	1.56	0	0.00	6	9.38	57	89.06	1.56	98.44	Appropriate
Haematological malignancies	0	0.00	0	0.00	0	0.00	8	12.50	56	87.50	0.00	100.00	Appropriate
HIV infection	4	6.25	23	35.94	7	10.94	20	31.25	10	15.63	42.19	46.88	Contested
Genetic disorders affecting the immune system	0	0.00	0	0.00	5	7.81	7	10.94	52	81.25	0.00	92.19	Appropriate
Lupus	2	3.13	8	12.50	10	15.63	16	25.00	28	43.75	15.63	68.75	Contested
Rheumatoid Arthritis	3	4.69	7	10.94	7	10.94	25	39.06	22	34.38	15.63	73.44	Contested
Inflammatory bowel disease	4	6.25	10	15.63	10	15.63	27	42.19	13	20.31	21.88	62.50	Contested

Scleroderma	6	9.38	8	12.50	14	21.88	18	28.13	18	28.13	21.88	56.25	Contested
Psoriasis	8	12.50	15	23.44	18	28.13	16	25.00	7	10.94	35.94	35.94	Contested

Clinical consensus statements - general

Statement	**Strongly disagree**	**%**	**Slightly disagree**	**%**	**Unsure**	**%**	**Slightly agree**	**%**	**Strongly agree**	**%**	**SUM disagree**	**SUM agree**	**Determination**
Immunosuppression is poorly defined	3	4.69	5	7.81	0	0.00	19	29.69	37	57.81	12.50	87.50	Agree
Current clinical definition is too expansive	5	7.81	18	28.13	11	17.19	18	28.13	12	18.75	35.94	46.88	Contested
Current clinical definition isn't expansive enough	11	17.19	18	28.13	13	20.31	18	28.13	4	6.25	45.31	34.38	Contested
Immunosuppressed and immunocompromised are exchangable terms	19	29.69	20	31.25	4	6.25	7	10.94	14	21.88	60.94	32.81	Contested
Immunosuppressed are sufficiently prioritised	19	29.69	24	37.50	3	4.69	9	14.06	9	14.06	67.19	28.13	Contested
COVID-19 no longer poses a threat to the immunocompromised	41	64.06	16	25.00	2	3.13	4	6.25	1	1.56	89.06	7.81	Disagree

Vulnerability to COVID-19 is similar for all immunosuppressed subgroups	49	76.56	11	17.19	2	3.13	1	1.56	1	1.56	93.75	3.13	Disagree
It is easy to pick out the immunosuppressed subgroups at most risk for COVID-19	14	21.88	32	50.00	6	9.38	9	14.06	3	4.69	71.88	18.75	Contested
COVID most at-risk subgroups are the same as seen in influenza	6	9.38	22	34.38	13	20.31	16	25.00	7	10.94	43.75	35.94	Contested
COVID care is overly one size fits all	10	15.63	9	14.06	5	7.81	23	35.94	17	26.56	29.69	62.50	Contested

Clinical consensus statements - dependencies

Statement	**Strongly disagree**	**%**	**Slightly disagree**	**%**	**Unsure**	**%**	**Slightly agree**	**%**	**Strongly agree**	**%**	**SUM disagree**	**SUM agree**	**Determination**
The patient's cancer is in remission	2	3.13	16	25.00	11	17.19	16	25.00	19	29.69	28.13	54.69	Contested
The patient's cancer is current untreated	11	17.19	27	42.19	11	17.19	11	17.19	4	6.25	59.38	23.44	Contested
The patient's cancer is classed as early stage (I)	4	6.25	15	23.44	11	17.19	23	35.94	11	17.19	29.69	53.13	Contested
The patient's HIV is drug-managed	1	1.56	6	9.38	12	18.75	23	35.94	22	34.38	10.94	70.31	Contested

The patient's inflammatory disease is currently untreated	8	12.50	21	32.81	16	25.00	12	18.75	7	10.94	45.31	29.69	Contested
The patient has been on immunosuppressive treatment for less than 6 months	26	40.63	25	39.06	9	14.06	4	6.25	0	0.00	79.69	6.25	Disagree
The patient's immunosuppressive regimen discontinued more than 6 months ago	5	7.81	20	31.25	11	17.19	18	28.13	10	15.63	39.06	43.75	Contested
The patient's immunosuppressive regimen discontinued more than 12 months ago	2	3.13	14	21.88	10	15.63	15	23.44	23	35.94	25.00	59.38	Contested
The patient is on low-dose immunosuppressives	10	15.63	22	34.38	10	15.63	13	20.31	9	14.06	50.00	34.38	Contested

Higher vs lower COVID-19 risk categorised data

Diagnosis	Higher Risk (n)	%	Lower Risk (n)	%	Consensus categorisation
Chronic stress	7	10.94	57	89.06	Lower
Sleep deprivation	7	10.94	57	89.06	Lower
Cochlear implant	11	17.19	53	82.81	Lower
Stunting	11	17.19	53	82.81	Lower
Drug-managed HIV	14	21.88	50	78.13	Lower
Ophthalmologic autoimmune	15	23.44	49	76.56	Lower
Cerebrospinal fluid leak	17	26.56	47	73.44	Lower
Anorexia nervosa	21	32.81	43	67.19	Lower
Autoimmune skin diseases	23	35.94	41	64.06	Lower
Endocrine autoimmune	23	35.94	41	64.06	Lower
Burn injuries	24	37.50	40	62.50	Lower
Gastrointestinal autoimmune	30	46.88	34	53.13	Lower
T2D	31	48.44	33	51.56	Lower
Malnutrition	32	50.00	32	50.00	Lower
Haematologic autoimmune	33	51.56	31	48.44	Higher
HIV infection	33	51.56	31	48.44	Higher
Neurologic autoimmune	34	53.13	30	46.88	Higher
Sickle cell disease	34	53.13	30	46.88	Higher
Nephrotic syndrome	35	54.69	29	45.31	Higher
Pregnancy	36	56.25	28	43.75	Higher
Asplenia	38	59.38	26	40.63	Higher
Solid tumours	38	59.38	26	40.63	Higher
Rheumatological disorders	40	62.50	24	37.50	Higher
Aplastic anemia	41	64.06	23	35.94	Higher
Renal autoimmune	42	65.63	22	34.38	Higher
Down syndrome	44	68.75	20	31.25	Higher
Chronic kidney disease	45	70.31	19	29.69	Higher
Islet transplant	45	70.31	19	29.69	Higher
Dialysis	52	81.25	12	18.75	Higher
Gernalised malignancies (metastasis)	53	82.81	11	17.19	Higher

Untreated HIV	55	85.94	9	14.06	Higher
Actively-treated malignancies	56	87.50	8	12.50	Higher
Underlying aberrant immunity	60	93.75	4	6.25	Higher
AIDS	62	96.88	2	3.13	Higher
Genetic disorders of immune system (PIDs)	62	96.88	2	3.13	Higher
Bone marrow	63	98.44	1	1.56	Higher
Haematological malignancies	64	100.00	0	0.00	Higher
Multi-organ transplant	64	100.00	0	0.00	Higher
SOT	64	100.00	0	0.00	Higher
Stem cell transplantation	64	100.00	0	0.00	Higher

Excess vulnerability data

Diagnosis	No additional vulnerability	%	Slightly elevated vulnerability	%	Significantly elevated vulnerability	%	High vulnerability	%	Extremely high vulnerability	%	SUM minimal additional vulnerability	SUM major additional vulnerability	Determination
Solid organ transplantation	1	1.56	0	0.00	8	12.50	22	34.38	33	51.56	1.56	85.94	Major
Bone marrow transplantation	1	1.56	1	1.56	5	7.81	14	21.88	43	67.19	3.13	89.06	Major
Stem cell transplantation	1	1.56	1	1.56	6	9.38	13	20.31	43	67.19	3.13	87.50	Major
Multi organ transplantation	1	1.56	0	0.00	7	10.94	15	23.44	41	64.06	1.56	87.50	Major
Islet transplantation	4	6.25	15	23.44	18	28.13	15	23.44	12	18.75	29.69	42.19	Contested
Haematological malignancies	2	3.13	1	1.56	5	7.81	23	35.94	33	51.56	4.69	87.50	Major
Solid tumours	2	3.13	13	20.31	25	39.06	20	31.25	4	6.25	23.44	37.50	Contested
Generalised malignancies	2	3.13	6	9.38	23	35.94	21	32.81	12	18.75	12.50	51.56	Contested
Actively treated malignancy	1	1.56	5	7.81	20	31.25	22	34.38	16	25.00	9.38	59.38	Contested
HIV infection	5	7.81	29	45.31	19	29.69	6	9.38	5	7.81	53.13	17.19	Contested
Drug-managed HIV	25	39.06	24	37.50	12	18.75	1	1.56	2	3.13	76.56	4.69	Minimal
Untreated HIV	4	6.25	10	15.63	20	31.25	16	25.00	14	21.88	21.88	46.88	Contested
AIDS	1	1.56	3	4.69	16	25.00	18	28.13	26	40.63	6.25	68.75	Contested
Genetic disorders affecting the immune system	1	1.56	3	4.69	9	14.06	25	39.06	26	40.63	6.25	79.69	Major
Down syndrome	6	9.38	18	28.13	20	31.25	14	21.88	6	9.38	37.50	31.25	Contested
Autoimmune skin diseases	13	20.31	27	42.19	18	28.13	4	6.25	2	3.13	62.50	9.38	Contested

Rheumatological disorders	6	9.38	16	25.00	27	42.19	13	20.31	2	3.13	34.38	23.44	Contested
Gastrointestinal autoimmune	7	10.94	28	43.75	19	29.69	8	12.50	2	3.13	54.69	15.63	Contested
Endocrine autoimmune	14	21.88	29	45.31	15	23.44	5	7.81	1	1.56	67.19	9.38	Contested
Neurologic autoimmune	6	9.38	23	35.94	23	35.94	9	14.06	3	4.69	45.31	18.75	Contested
Haematologic autoimmune	11	17.19	22	34.38	21	32.81	7	10.94	3	4.69	51.56	15.63	Contested
Renal autoimmune	5	7.81	17	26.56	22	34.38	16	25.00	4	6.25	34.38	31.25	Contested
Opthalmologic autoimmune	24	37.50	24	37.50	9	14.06	6	9.38	1	1.56	75.00	10.94	Minimal
Underlying aberrant immunity	1	1.56	9	14.06	11	17.19	21	32.81	22	34.38	15.63	67.19	Contested
Type 2 Diabetes	12	18.75	24	37.50	18	28.13	8	12.50	2	3.13	56.25	15.63	Contested
Asplenia	14	21.88	19	29.69	16	25.00	9	14.06	6	9.38	51.56	23.44	Contested
Aplastic anaemia	8	12.50	21	32.81	13	20.31	12	18.75	10	15.63	45.31	34.38	Contested
Sickle cell	15	23.44	19	29.69	16	25.00	9	14.06	5	7.81	53.13	21.88	Contested
Chronic kidney disease	6	9.38	16	25.00	25	39.06	13	20.31	4	6.25	34.38	26.56	Contested
Nephrotic disease	11	17.19	14	21.88	25	39.06	7	10.94	7	10.94	39.06	21.88	Contested
Dialysis	5	7.81	10	15.63	22	34.38	13	20.31	14	21.88	23.44	42.19	Contested
Cerebrospinal fluid leak	29	45.31	16	25.00	12	18.75	5	7.81	2	3.13	70.31	10.94	Contested
Cochlear implant	37	57.81	15	23.44	7	10.94	4	6.25	1	1.56	81.25	7.81	Minimal
Burn injuries	22	34.38	22	34.38	11	17.19	7	10.94	2	3.13	68.75	14.06	Contested
Pregnancy	9	14.06	24	37.50	21	32.81	5	7.81	5	7.81	51.56	15.63	Contested
Chronic stress	35	54.69	24	37.50	5	7.81	0	0.00	0	0.00	92.19	0.00	Minimal
Sleep deprivation	38	59.38	18	28.13	8	12.50	0	0.00	0	0.00	87.50	0.00	Minimal

Malnutrition	15	23.44	26	40.63	15	23.44	6	9.38	2	3.13	64.06	12.50	Contested
Stunting	32	50.00	22	34.38	8	12.50	1	1.56	1	1.56	84.38	3.13	Minimal
Anorexia nervosa	25	39.06	23	35.94	12	18.75	3	4.69	1	1.56	75.00	6.25	Minimal

Round 2 Interim Data

Evaluation of risk-categorised phenotype draft

Statement	Strongly disagree	%	Somewhat disagree	%	Unsure	%	Somewhat agree	%	Strongly agree	%	SUM disagree	SUM agree	Determination
Accurate representation of results from last round	1	1.67	1	1.67	5	8.33	26	43.33	27	45.00	3.33	88.33	Agree
Correct higher/lower risk allocation	0	0.00	8	13.33	1	1.67	37	61.67	14	23.33	13.33	85.00	Agree
Step forward for representing Immunosuppressed outcomes	2	3.33	3	5.00	4	6.67	25	41.67	26	43.33	8.33	85.00	Agree
Useful in other disease use-cases	0	0.00	7	11.67	9	15.00	27	45.00	17	28.33	11.67	73.33	Contested

Evaluation of risk-stratified phenotype draft

Statement	Strongly disagree	%	Somewhat disagree	%	Unsure	%	Somewhat agree	%	Strongly agree	%	SUM disagree	SUM agree	Determination
Accurate representation of results from last round	1	1.67	2	3.33	4	6.67	24	40.00	29	48.33	5.00	88.33	Agree
Levels in correct order of risk	1	1.67	5	8.33	5	8.33	34	56.67	15	25.00	10.00	81.67	Agree
Conditions are correctly allocated to levels	2	3.33	7	11.67	7	11.67	25	41.67	19	31.67	15.00	73.33	Contested
Step forward for representing Immunosuppressed outcomes	2	3.33	1	1.67	10	16.67	24	40.00	23	38.33	5.00	78.33	Agree
Useful in other disease domains	1	1.67	7	11.67	15	25.00	24	40.00	13	21.67	13.33	61.67	Contested

Appropriateness for inclusion in a phenotype of 'adult immunosuppression' data

Diagnosis	Not appropriate	%	Somewhat inappropriate	%	Unsure	%	Somewhat appropriate	%	Appropriate	%	SUM disagree	SUM agree	Determination
Multi-organ transplantation	0	0.00	0	0.00	1	1.67	1	1.67	58	96.67	0.00	98.34	Appropriate
Islet transplantation	1	1.67	2	3.33	10	16.67	20	33.33	27	45.00	5.00	78.33	Appropriate
Solid tumours	0	0.00	3	5.00	8	13.33	25	41.67	24	40.00	5.00	81.67	Appropriate
Generalised malignancies (metastasis)	0	0.00	1	1.67	4	6.67	16	26.67	39	65.00	1.67	91.67	Appropriate
Drug-managed HIV	8	13.33	23	38.33	13	21.67	12	20.00	4	6.67	51.66	26.67	Contested
Untreated HIV	1	1.67	2	3.33	2	3.33	19	31.67	36	60.00	5.00	91.67	Appropriate
AIDS-defining illness	0	0.00	1	1.67	0	0.00	11	18.33	48	80.00	1.67	98.33	Appropriate
Down Syndrome	0	0.00	7	11.67	13	21.67	27	45.00	13	21.67	11.67	66.67	Contested
Autoimmune skin diseases	0	0.00	15	25.00	19	31.67	22	36.67	4	6.67	25.00	43.34	Contested
Rheumatologic disorders	0	0.00	9	15.00	5	8.33	35	58.33	11	18.33	15.00	76.66	Appropriate
Gastrointestinal autoimmune disorders	0	0.00	11	18.33	11	18.33	32	53.33	6	10.00	18.33	63.33	Contested
Endocrine autoimmune disorders	2	3.33	21	35.00	15	25.00	19	31.67	3	5.00	38.33	36.67	Contested

Neurologic autoimmune disorders	0	0.00	10	16.67	13	21.67	31	51.67	6	10.00	16.67	61.67	Contested
Hematologic autoimmune disorders	1	1.67	8	13.33	16	26.67	26	43.33	9	15.00	15.00	58.33	Contested
Renal autoimmune disorders	0	0.00	6	10.00	10	16.67	30	50.00	14	23.33	10.00	73.33	Contested
Ophthalmologic autoimmune disorders	4	6.67	23	38.33	15	25.00	14	23.33	4	6.67	45.00	30.00	Contested
Underlying aberrant immunity	0	0.00	1	1.67	1	1.67	17	28.33	41	68.33	1.67	96.66	Appropriate
Type 2 Diabetes	6	10.00	21	35.00	10	16.67	19	31.67	4	6.67	45.00	38.34	Contested
Asplenia	5	8.33	6	10.00	7	11.67	21	35.00	21	35.00	18.33	70.00	Contested
Aplastic anaemia	1	1.67	8	13.33	5	8.33	20	33.33	26	43.33	15.00	76.66	Appropriate
Sickle cell disease	5	8.33	10	16.67	14	23.33	20	33.33	11	18.33	25.00	51.66	Contested
Chronic kidney disease	1	1.67	9	15.00	11	18.33	28	46.67	11	18.33	16.67	65.00	Contested
Nephrotic disease	1	1.67	9	15.00	9	15.00	26	43.33	15	25.00	16.67	68.33	Contested
Dialysis	0	0.00	4	6.67	4	6.67	27	45.00	25	41.67	6.67	86.67	Appropriate
Cerebrospinal fluid leak	11	18.33	16	26.67	17	28.33	9	15.00	7	11.67	45.00	26.67	Contested
Cochlear implant	19	31.67	19	31.67	12	20.00	5	8.33	5	8.33	63.34	16.66	Contested
Burn injuries	7	11.67	17	28.33	12	20.00	19	31.67	5	8.33	40.00	40.00	Contested
Pregnancy	10	16.67	12	20.00	6	10.00	25	41.67	7	11.67	36.67	53.34	Contested

Chronic stress	35	58.33	11	18.33	9	15.00	4	6.67	1	1.67	76.66	8.34	Inappropriate
Sleep deprivation	36	60.00	11	18.33	10	16.67	2	3.33	1	1.67	78.33	5.00	Inappropriate
Malnutrition	18	30.00	10	16.67	13	21.67	16	26.67	3	5.00	46.67	31.67	Contested
Stunting	27	45.00	15	25.00	14	23.33	3	5.00	1	1.67	70.00	6.67	Contested
Anorexia	25	41.67	9	15.00	14	23.33	10	16.67	2	3.33	56.67	20.00	Contested
SOT	0	0.00	0	0.00	0	0.00	2	3.33	58	96.67	0.00	100.00	Appropriate
Bone marrow transplantation	0	0.00	0	0.00	0	0.00	2	3.33	58	96.67	0.00	100.00	Appropriate
Stem cell transplantation	0	0.00	0	0.00	0	0.00	1	1.67	59	98.33	0.00	100.00	Appropriate
Haematological malignancies	0	0.00	0	0.00	0	0.00	3	5.00	57	95.00	0.00	100.00	Appropriate
Actively treated malignancy	0	0.00	0	0.00	1	1.67	12	20.00	47	78.33	0.00	98.33	Appropriate
HIV infection	3	5.00	28	46.67	7	11.67	16	26.67	6	10.00	51.67	36.67	Contested
Genetic disorders affecting the immune system	0	0.00	2	3.33	2	3.33	11	18.33	45	75.00	3.33	93.33	Appropriate
Lupus	0	0.00	2	3.33	10	16.67	23	38.33	25	41.67	3.33	80.00	Appropriate
Rheumatoid Arthritis	0	0.00	4	6.67	7	11.67	35	58.33	14	23.33	6.67	81.67	Appropriate
Inflammatory bowel disease	0	0.00	9	15.00	12	20.00	28	46.67	11	18.33	15.00	65.00	Contested
Scleroderma	0	0.00	10	16.67	13	21.67	24	40.00	13	21.67	16.67	61.67	Contested
Psoriasis	4	6.67	19	16.00	16	26.67	18	30.00	3	5.00	22.67	35.00	Contested

Appropriateness of panellist recommendations for inclusion in a phenotype of 'adult immunosuppression' data

Diagnosis	Not appropriate (n)	%	Somewhat inappropriate (n)	%	Unsure (n)	%	Somewhat appropriate (n)	%	Appropriate (n)	%	SUM disagree	SUM agree	Determination
Cystic fibrosis	3	5.00	10	16.67	5	8.33	21	35.00	21	35.00	21.67	70.00	Contested
COPD	4	6.67	14	23.33	8	13.33	26	43.33	8	13.33	30.00	56.67	Contested
Liver disease	0	0.00	10	16.67	7	11.67	30	50.00	13	21.67	16.67	71.67	Contested
ME/CFS	27	45.00	13	21.67	17	28.33	2	3.33	1	1.67	66.67	5.00	Contested
Skin grafts	10	16.67	14	23.33	16	26.67	16	26.67	4	6.67	40.00	33.33	Contested
Obesity	11	18.33	20	33.33	10	16.67	16	26.67	3	5.00	51.67	31.67	Contested
Preterm births	2	3.33	12	20.00	13	21.67	19	31.67	14	23.33	23.33	55.00	Contested

Clinical consensus statements - general

Statement	Strongly disagree	%	Slightly disagree	%	Unsure	%	Slightly agree	%	Strongly agree	%	SUM disagree	SUM agree	Determination
Immunosuppression is poorly defined	0	0.00	4	6.25	1	1.67	25	41.67	30	50.00	6.25	91.67	Agree
Current clinical definition is too expansive	1	1.67	16	25.00	7	11.67	28	46.67	8	13.33	26.67	60.00	Contested
Current clinical definition isn't expansive enough	6	10.00	25	39.06	11	18.33	17	28.33	1	1.67	49.06	30.00	Contested
Immunosuppressed and immunocompromised are exchangeable terms	17	28.33	21	32.81	5	8.33	11	18.33	6	10.00	61.15	28.33	Contested
Immunosuppressed are sufficiently prioritised	17	28.33	20	31.25	5	8.33	15	25.00	3	5.00	59.58	30.00	Contested
COVID-19 no longer poses a threat to the immunocompromised	42	70.00	16	25.00	0	0.00	2	3.33	0	0.00	95.00	3.33	Disagree
Vulnerability to COVID-19 is similar for all immunosuppressed subgroups	44	73.33	14	21.88	0	0.00	0	0.00	2	3.33	95.21	3.33	Disagree
It is easy to pick out the immunosuppressed	9	15.00	35	54.69	3	5.00	13	21.67	0	0.00	69.69	21.67	Contested

subgroups at most risk for COVID-19													
COVID most at-risk subgroups are the same as seen in influenza	6	10.00	23	35.94	8	13.33	20	33.33	3	5.00	45.94	38.33	Contested
COVID care is overly one size fits all	4	6.67	10	15.63	3	5.00	33	55.00	10	16.67	22.29	71.67	Contested

Clinical consensus statements - dependencies

Statement	Strongly disagree	%	Slightly disagree	%	Unsure	%	Slightly agree	%	Strongly agree	%	SUM disagree	SUM agree	Determination
The patient's cancer is in remission	1	1.67	11	18.33	6	10.00	26	43.33	16	26.67	20.00	70.00	Contested
The patient's cancer is current untreated	13	21.67	19	31.67	5	8.33	9	15.00	4	6.67	53.33	21.67	Contested
The patient's cancer is classed as early stage (I)	1	1.67	15	25.00	10	16.67	24	40.00	10	16.67	26.67	56.67	Contested
The patient's HIV is drug-managed	3	5.00	4	6.67	4	6.67	28	46.67	21	35.00	11.67	81.67	Agree
The patient's inflammatory disease is currently untreated	9	15.00	17	28.33	11	18.33	16	26.67	7	11.67	43.33	38.33	Contested
The patient has been on immunosuppressive treatment for less than 6 months	24	40.00	27	45.00	5	8.33	3	5.00	1	1.67	85.00	6.67	Disagree
The patient's immunosuppressive regimen discontinued more than 6 months ago	1	1.67	16	26.67	11	18.33	29	48.33	3	5.00	28.33	53.33	Contested
The patient's immunosuppressive regimen discontinued	1	1.67	6	10.00	4	6.67	29	48.33	20	33.33	11.67	81.67	Agree

more than 12 months ago													
The patient's immunosuppressive regimen discontinued more than 3 years ago	2	3.33	0	0.00	4	6.67	19	31.67	35	58.33	3.33	90.00	Agree
The patient is on low-dose immunosuppressives	14	23.33	26	43.33	6	10.00	11	18.33	3	5.00	66.67	23.33	Contested
The patient is on very low-dose immunosuppressives	7	11.67	15	25.00	9	15.00	22	36.67	7	11.67	36.67	48.33	Contested

Higher vs lower COVID-19 risk categorised data

Diagnosis	Higher Risk (n)	%	Lower Risk (n)	%	Consensus categorisation
ME/CFS	4	6.67	56	93.33	Lower
Chronic stress	6	10.00	54	90.00	Lower
Sleep deprivation	6	10.00	54	90.00	Lower
Drug-managed HIV	7	11.67	53	88.33	Lower
Stunting	8	13.33	52	86.67	Lower
Cochlear implants	11	18.33	49	81.67	Lower
Anorexia	12	20.00	48	80.00	Lower
Cerebrospinal fluid leak	14	23.33	46	76.67	Lower
Opthalmologic autoimmune	16	26.67	44	73.33	Contested
Burn injuries	17	28.33	43	71.67	Contested
Malnutrition	17	28.33	43	71.67	Contested
Skin grafts	17	28.33	43	71.67	Contested
T2D	20	33.33	40	66.67	Contested
Endocrine autoimmune	22	36.67	38	63.33	Contested
Autoimmune skin diseases	23	38.33	37	61.67	Contested
Gastrointestinal autoimmune	28	46.67	32	53.33	Contested
Obesity	29	48.33	31	51.67	Contested
Pregnancy	33	55.00	27	45.00	Contested
Preterm births	33	55.00	27	45.00	Contested
Asplenia	36	60.00	24	40.00	Contested
Neurologic autoimmune	36	60.00	24	40.00	Contested
HIV infection (all levels)	37	61.67	23	38.33	Contested
Down syndrome	39	65.00	21	35.00	Contested
Liver disease	39	65.00	21	35.00	Contested
Sickle cell disease	39	65.00	21	35.00	Contested
Haematologic autoimmune	41	68.33	19	31.67	Contested
COPD	42	70.00	18	30.00	Contested
Cystic fibrosis	42	70.00	18	30.00	Contested
Nephrotic syndrome	43	71.67	17	28.33	Contested
Chronic kidney disease	44	73.33	16	26.67	Contested

Rheumatological disorders	44	73.33	16	26.67	Contested
Aplastic anaemia	45	75.00	15	25.00	Higher
Solid tumours	45	75.00	15	25.00	Higher
Renal autoimmune	46	76.67	14	23.33	Higher
Dialysis	50	83.33	10	16.67	Higher
Islet transplant	52	86.67	8	13.33	Higher
Underlying aberrant immunity	53	88.33	7	11.67	Higher
Generalised malignancies (metastasis)	54	90.00	6	10.00	Higher
Untreated HIV	55	91.67	5	8.33	Higher
Actively treated malignancies	56	93.33	4	6.67	Higher
AIDS-defining illness	56	93.33	4	6.67	Higher
Genetic diseases (PIDs)	56	93.33	4	6.67	Higher
Bone marrow	59	98.33	1	1.67	Higher
Haematological malignancies	59	98.33	1	1.67	Higher
Multi-organ transplant	59	98.33	1	1.67	Higher
SOT	59	98.33	1	1.67	Higher
Stem cell transplant	59	98.33	1	1.67	Higher

Excess vulnerability data

Condition	No additional vulnerability	%	Slightly elevated vulnerability	%	Significantly elevated vulnerability	%	High vulnerability	%	Extremely high vulnerability	%	SUM minimal additional vulnerability	SUM major additional vulnerability	Determination
Solid organ transplantation	0	0.00	0	0.00	6	10.00	8	13.33	46	76.67	0.00	90.00	Major
Bone marrow transplantation	0	0.00	0	0.00	4	6.67	5	8.33	51	85.00	0.00	93.33	Major
Stem cell transplanatation	0	0.00	0	0.00	3	5.00	6	10.00	51	85.00	0.00	95.00	Major
Multi organ transplantation	0	0.00	0	0.00	3	5.00	6	10.00	51	85.00	0.00	95.00	Major
Islet transplantation	3	5.00	5	8.33	17	28.33	20	33.33	15	25.00	13.33	58.33	Contested
Haematological malignancies	0	0.00	1	1.67	4	6.67	16	26.67	39	65.00	1.67	91.67	Major
Solid tumours	0	0.00	9	15.00	19	31.67	22	36.67	10	16.67	15.00	53.33	Contested
Generalised malignancies (metastasis)	0	0.00	5	8.33	13	21.67	24	40.00	18	30.00	8.33	70.00	Contested
Actively treated malignancy	1	1.67	8	13.33	10	16.67	24	40.00	17	28.33	15.00	68.33	Contested
HIV infection all stages	3	5.00	29	48.33	13	21.67	12	20.00	3	5.00	53.33	25.00	Contested
Drug-managed HIV	23	38.33	26	43.33	9	15.00	2	3.33	0	0.00	81.67	3.33	Minimal
Untreated HIV	1	1.67	8	13.33	16	26.67	25	41.67	10	16.67	15.00	58.33	Contested
AIDS-defining illness	0	0.00	2	3.33	13	21.67	16	26.67	29	48.33	3.33	75.00	Major
Genetic disorders affecting the immune system	0	0.00	2	3.33	5	8.33	18	30.00	35	58.33	3.33	88.33	Major

Down syndrome	3	5.00	13	21.67	25	41.67	13	21.67	6	10.00	26.67	31.67	Contested
Autoimmune skin diseases	5	8.33	36	60.00	13	21.67	5	8.33	1	1.67	68.33	10.00	Contested
Rheumatological disorders	2	3.33	16	26.67	26	43.33	14	23.33	2	3.33	30.00	26.67	Contested
Gastrointestinal autoimmune disorders	4	6.67	31	51.67	16	26.67	9	15.00	0	0.00	58.33	15.00	Contested
Endocrine autoimmune disorders	10	16.67	30	50.00	14	23.33	6	10.00	0	0.00	66.67	10.00	Contested
Neurologic autoimmune disorders	4	6.67	27	45.00	20	33.33	9	15.00	0	0.00	51.67	15.00	Contested
Haematologic autoimmune disorders	5	8.33	19	31.67	22	36.67	11	18.33	3	5.00	40.00	23.33	Contested
Renal autoimmune disorders	3	5.00	14	23.33	23	38.33	17	28.33	3	5.00	28.33	33.33	Contested
Opthalmologic autoimmune disorders	17	28.33	31	51.67	8	13.33	4	6.67	0	0.00	80.00	6.67	Minimal
Underlying aberrant immunity	0	0.00	7	11.67	6	10.00	22	36.67	25	41.67	11.67	78.33	Major
Type 2 diabetes mellitus	9	15.00	29	48.33	12	20.00	10	16.67	0	0.00	63.33	16.67	Contested
Asplenia (anatomic/ functional)	12	20.00	18	30.00	14	23.33	13	21.67	3	5.00	50.00	26.67	Contested
Aplastic anemia	6	10.00	16	26.67	12	20.00	22	36.67	4	6.67	36.67	43.33	Contested
Sickle cell disease	8	13.33	21	35.00	17	28.33	13	21.67	1	1.67	48.33	23.33	Contested
Chronic kidney disease	1	1.67	17	28.33	24	40.00	18	30.00	0	0.00	30.00	30.00	Contested
Nephrotic disease	2	3.33	21	35.00	20	33.33	16	26.67	1	1.67	38.33	28.33	Contested
Dialysis	0	0.00	13	21.67	17	28.33	21	35.00	9	15.00	21.67	50.00	Contested

Cystic fibrosis	5	8.33	14	23.33	21	35.00	12	20.00	8	13.33	31.67	33.33	Contested
Chronic obstructive pulmonary disease	6	10.00	13	21.67	21	35.00	15	25.00	5	8.33	31.67	33.33	Contested
Liver disease (including cirrhotic)	5	8.33	20	33.33	22	36.67	11	18.33	2	3.33	41.67	21.67	Contested
Cerebrospinal fluid leak	33	55.00	17	28.33	4	6.67	5	8.33	1	1.67	83.33	10.00	Minimal
Cochlear implant	40	66.67	10	16.67	4	6.67	5	8.33	1	1.67	83.33	10.00	Minimal
Burn injuries	26	43.33	17	28.33	12	20.00	5	8.33	0	0.00	71.67	8.33	Contested
Skin graft recipients	25	41.67	20	33.33	6	10.00	8	13.33	1	1.67	75.00	15.00	Minimal
Pregnancy	10	16.67	23	38.33	18	30.00	8	13.33	1	1.67	55.00	15.00	Contested
Pre-term births	4	6.67	26	43.33	14	23.33	15	25.00	1	1.67	50.00	26.67	Contested
Chronic stress	38	63.33	19	31.67	2	3.33	1	1.67	0	0.00	95.00	1.67	Minimal
Sleep deprivation	42	70.00	16	26.67	1	1.67	1	1.67	0	0.00	96.67	1.67	Minimal
Malnutrition	19	31.67	28	46.67	10	16.67	3	5.00	0	0.00	78.33	5.00	Minimal
Stunting	37	61.67	19	31.67	3	5.00	1	1.67	0	0.00	93.33	1.67	Minimal
Obesity	13	21.67	26	43.33	11	18.33	8	13.33	2	3.33	65.00	16.67	Contested
Anorexia nervosa	27	45.00	25	41.67	7	11.67	1	1.67	0	0.00	86.67	1.67	Minimal
Myalgic encephalomyelitis/ Chronic fatigue syndrome	42	70.00	16	26.67	1	1.67	1	1.67	0	0.00	96.67	1.67	Minimal

Data presented at Final Discussion

Evaluation of risk-categorised phenotype draft

Statement	Strongly disagree	%	Somewhat disagree	%	Unsure	%	Somewhat agree	%	Strongly agree	%	SUM disagree	SUM agree	Determination
This version was an improvement to the last draft	0	0.00	0	0.00	2	5.13	22	56.41	15	38.46	0.00	94.87	Agree
Prefer three part to two part	0	0.00	1	2.56	0	0.00	10	25.64	28	71.79	2.56	97.44	Agree
Drug managed HIV is fair active control	0	0.00	5	12.82	10	25.64	15	38.46	9	23.08	12.82	61.54	Contested
Useful to compare phenotype data to active control	0	0.00	5	12.82	8	20.51	18	46.15	8	20.51	12.82	66.67	Contested
Phenotype is accurate reflection of last round	0	0.00	0	0.00	3	7.69	20	51.28	16	41.03	0.00	92.31	Agree
Correct allocation	0	0.00	5	12.82	2	5.13	16	41.03	16	41.03	12.82	82.05	Agree
Step forward for subdividing data	1	2.56	1	2.56	2	5.13	13	33.33	22	56.41	5.13	89.74	Agree
Clinically useful to test transferability to other disease domains	1	2.56	1	2.56	9	23.08	16	41.03	12	30.77	5.13	71.79	Contested

Evaluation of risk-stratified phenotype draft

Statement	Strongly disagree	%	Somewhat disagree	%	Unsure	%	Somewhat agree	%	Strongly agree	%	SUM disagree	SUM agree	Determination
This version was an improvement to the last draft	0	0.00	1	2.56	3	7.69	19	48.72	16	41.03	2.56	89.74	Agree
Accurate representation of last round	0	0.00	1	2.56	3	7.69	18	46.15	17	43.59	2.56	89.74	Agree
Drug managed HIV is fair active control	1	2.56	3	7.69	12	30.77	15	38.46	8	20.51	10.26	58.97	Contested
Useful to compare phenotype data to active control	1	2.56	4	10.26	9	23.08	16	41.03	9	23.08	12.82	64.10	Contested
Phenotype in correct order	1	2.56	3	7.69	4	10.26	20	51.28	11	28.21	10.26	79.49	Agree
Conditions correctly allocated	1	2.56	6	15.38	1	2.56	20	51.28	11	28.21	17.95	79.49	Agree
Step forward for subdividing data	1	2.56	4	10.26	2	5.13	14	35.90	18	46.15	12.82	82.05	Agree
Clinically useful to test transferability to other disease domains	1	2.56	3	7.69	6	15.38	17	43.59	12	30.77	10.26	74.36	Contested

Clinical consensus statements – general

Statement	Strongly disagree	%	Somewhat disagree	%	Unsure	%	Somewhat agree	%	Strongly agree	%	SUM disagree	SUM agree	Determination
Current clinical definition is too expansive	2	5.13	4	10.26	6	15.38	14	35.90	13	33.33	15.38	69.23	Contested
Current clinical definition isn't expansive enough	9	23.08	17	43.59	3	7.69	9	23.08	1	2.56	66.67	25.64	Contested
Immunosuppressed and immunocompromised are exchangeable terms	10	25.64	17	43.59	1	2.56	6	15.38	5	12.82	69.23	28.21	Contested
Immunosuppressed are sufficiently prioritised	7	17.95	19	48.72	3	7.69	10	25.64	0	0.00	66.67	25.64	Contested
It is easy to pick out the immunosuppressed subgroups at most risk for COVID-19	2	5.13	18	46.15	4	10.26	14	35.90	1	2.56	51.28	38.46	Contested
COVID most at-risk subgroups are the same as seen in influenza	5	12.82	15	38.46	5	12.82	13	33.33	1	2.56	51.28	35.90	Contested
COVID care is overly one size fits all	2	5.13	4	10.26	1	2.56	22	56.41	10	25.64	15.38	82.05	Agree

Clinical consensus statements - dependencies

Statement	Strongly disagree	%	Somewhat disagree	%	Unsure	%	Somewhat agree	%	Strongly agree	%	SUM disagree	SUM agree	Determination
Cancer in remission	3	7.69	4	10.26	2	5.13	22	56.41	8	20.51	17.95	76.92	Agree
Cancer untreated	7	17.95	23	58.97	2	5.13	6	15.38	1	2.56	76.92	17.95	Disagree
Early cancer	6	15.38	5	12.82	10	25.64	16	41.03	2	5.13	28.21	46.15	Contested
Inflammatory disease untreated	6	15.38	15	38.46	3	7.69	11	28.21	4	10.26	53.85	38.46	Contested
Discontinuation of immunosuppression more than 6 months ago	0	0.00	16	41.03	5	12.82	12	30.77	6	15.38	41.03	46.15	Contested
Low dose pred equivalent	9	23.08	17	43.59	5	12.82	5	12.82	3	7.69	66.67	20.51	Contested
Very low dose pred equivalent	3	7.69	12	30.77	4	10.26	13	33.33	7	17.95	38.46	51.28	Contested

Appendix 15: Written summary of final discussion groups

Final Discussion (Round 3): Summary Notes

Round 3 participants: n = 40 (pre-discussion group data provided by 39)

1. **Phenotype 1: Risk-categorised**

General criticisms:

- Preference for 3-part over 2-part phenotype – still appetite to see more subdivisions as complexity of these cases and specific immunodeficiencies need to be demarcated while balancing what can be implemented clinically.
    - However, given that this exercise is intended to support binary clinical decision-making (prescribe vs don't prescribe, boost vaccinate vs don't boost vaccinate), a case could be made that the previous two-part model was more clinically helpful. Need to give careful thought to which of the three categories should be prioritised for enhanced medical attention – just major additional risk, or also major + modifiable?
    - Need to ensure that high risk category is specific to those who would warrant enhanced medical support; Green Book specifications span 4% of population which is far too high for prioritisation.
- There is significant heterogeneity in the 'moderate' group – they could easily tip into high/ low categories depending on medication. Group should be renamed around consensus achieved as cannot infer non-consensus group is middling risk – **'Consensus lower risk immunosuppressed', 'No Consensus' and 'Consensus higher risk immunosuppressed'.**
- Significant internal heterogeneity
- Influence of medications not incorporated in phenotype, but seemingly incorporated in the proposed active control
- Messy middle – easily catapulted into higher risk when medication variables are considered
- Continued emphasis that these risk phenotypes must not be used as clinical decision-making tools until fully validated in real-world data.
- Importance to be very cautious with transferability claims – write up must anchor on the prospective, but still unproven, surveillance value of subdividing wider disease outcomes in this same way. COVID is extremely idiosyncratic.

Specific criticisms:

- Does the lower risk category really add much value?
- Need to reconsider inclusion of wider determinants – their retention may be academically interesting, but clinically problematic if the net is cast too wide for immunosuppressed call up (vaccines, shielding etc).

2. **Phenotype 2: Multi-level hierarchy**

General criticisms:

- Some confusion around how this phenotype was constructed*: researcher had to provide context on parallel data inputs (balancing COVID vulnerability scores with population size considerations and need for common clinical/ anatomical denominator as opposed to stringing together disparate conditions) – data indicates that panellists did think these strata reflected results from last round, however.*
- Felt to be too complicated with not enough data to support internal nuances – first phenotype was preferred by some.

- Same criticisms of high levels of internal heterogeneity, often more influenced by medication than diagnosis. For this hierarchy to be as clinically helpful as possible, it's vital that the highest risk patients are pulled out from the rest of the pack. Overly generalised definitions – even 'haematological malignancy' – swallows up unique risk profiles. Staying at the generic level will still underserve these patients. Surveillance must therefore be iterative, even after this point of subdivision – each level should be interrogated for internal subtrends.
- Slightly more contention with the 10-part hierarchy than the cruder 3-part cut.
- Concerns that this phenotype is over scoped; recommendation to restrict inclusion to those who would be considered eligible for enhanced medical support.
- Careful language is needed to ensure this is not phenotype is not positioned as an aid for clinical decision-making until rigorous validation has occurred. Must establish that the cadence of these risk levels holds when applied in real world data.
- Despite positive feedback, panellists emphasised that it was vital to not position risk as linear/ ordinal/ an even staircase. Certain levels are almost synonymous in risk with considerable departures between first 3 levels to 4th. 1-3, 4-7 and 8-10. Risk is not stepwise – each change in level does not denote same scale of change in risk profile. **May be best to band risk levels – reconciling phenotypes 1 and 2.**
- Specific features of COVID make this hierarchy likely disease specific.
- Careful language is also needed about the specificities of this risk cadence – not generalisable to paediatric cases/ fungal or bacterial infections without being tested. For example, because this is an adult risk cadence, it would not be appropriate for conditions where risk is highest in young children. Language therefore needs to specify that these risk categories *'may' be transferable*, subject to further validation; this should be considered a framework to be applied to subdividing disease surveillance in future outbreaks/ pandemics. It would be clinically valuable to look for similarities in disease surveillance, however, and to capture major areas of departure.

Specific criticisms:

- Confusion over why certain terms were included – *researcher had to explain 'equal opportunities' approach to scraping candidate conditions from parallel vaccine decision-making manuals.*
- Some panellists felt existing immunosuppressed risk hierarchies were more comprehensive and clinically accurate (e.g. CDC) – *researcher had to explain their non-compatibility with CMR surveillance data flows.*
- Need to tightly boundary all levels when operationalised e.g. what type of anaemia? What stage of CKD? Solid tumours ever or those without remission codes?
- Operationalising CKD – Later stage (4+).
- Must change autoinflammatory language to immune-mediated inflammatory disease (IMID).
- Gastro-autoimmunity should be in systemic category
- Combine bone marrow and stem cell transplantation into 'hematopoietic stem cell transplantation'
- Overall agreement that systemic and single site demarcation is useful, however, there was some dissent on this and the instruction to caveat the generalised impacts of single-site conditions e.g. psoriasis.
- Query whether solid tumours should even be situated as high risk as they are currently.
- Concerns about inclusion of wider determinants of immunosuppression specifically – interesting academically but potentially detrimental clinically.
- Questioning inclusion of asplenia and amenia – unsure how much risk is conferred.
- Pregnancy as exceedingly high risk in certain circumstances (unvaccinated third trimester) – not to mention this represents two lives at stake.

- Some panellists took issue with the inclusion of renal forms of immunosuppression and the absence of pulmonary, liver and cardiac candidates – *researcher had to explain that these were put to panellists but did not meet ≥75% inclusion.*

3. The use of drug/well-managed HIV as an active control or internal reference category:

- General feeling that drug-managed /well-managed HIV would be a valuable internal reference point from a hypothesis generating perspective.
    - However, some confusion around suggested active control group; *researcher had to contextualise this with previous experiences conducting vaccine effectiveness research (disparities in vaccine uptake between immunocompetent and compromised invalidates comparisons).*
    - From an international perspective HIV is still a COVID risk-factor; its use as an active control would be disputed in less resourced contexts
    - Pointed out that rheumatoid arthritis could just as readily be used for this purpose.
- Drug-managed HIV cannot be in lieu of a general population comparator group – important to see how vastly different incidence rates are. General population comparator should be age-stratified, if possible.
- Automating the operationalisation of drug-managed HIV is impossible – an extract will only tell us that an HIV patient has received a drug, we don't know if they're taking the drug and we don't know their prevailing immune state (e.g. CD4 count). Also, impossible to rule out drug holidays etc.
- Drug-managed HIV also has huge internal heterogeneity – when did treatment start, what is adherence level etc.?
- 'Well-managed' component would have to be assumptive e.g. extracting all HIV patients, excluding AIDS and conditions consistent with AIDS.
- Ideally CD4 count would be incorporated for absolute assurance on immunocompetence.

4. General consensus statements:

- General consensus statements will never obtain international agreement, even if run multiple times more.
- Important to identify throughlines of why consensus couldn't be made e.g. international scope of panel, diverse interpretations of questions (e.g. disappointment in pharmaceutical companies lack of dedicated trials vs satisfaction with ringfencing attempts determined response to sufficiently prioritised question). Immunosuppressed / pregnant patients were not incorporated into pharmaceutical R&D; post-hoc decisions had to be made which was enormously underserving and potentially fatal.
- Immunocompromise and immunosuppressed are used synonymously in common parlance but this is not clinically correct. That said, even amongst clinicians there is continued confusion over where the line of differentiation is drawn and it would be helpful if consensus could be built on this specific issue. For some, the difference is one of temporality (e.g. immunocompromised as long-term, immunosuppressed as short-term), for others, one is a state (immunocompromised), the other is an action (use of immunosuppressive protocols).
- 'One size fits all' care for the immunosuppressed not necessarily a bad thing in all cases: given the sensitivity of the vaccine issue, creating stratifications/ stricter roll-out may just disincentivise uptake wholesale and keep circulation – and resulting dangers – higher than would be achieved without universal vaccination.
- Transferability will have to be tested rigorously – likely that viral conditions exacerbate underlying issues more than bacterial/ fungal counterparts.
- Data on immunosuppressed risk profiles for other respiratory viral infections is scant.
- Recognition that delivery of treatments/ antivirals needs to be more nuanced or qualified than it currently is.

5. Conditionalities consensus statements:

- Insufficient data to weigh in on the granularities – felt like splitting hairs between 6 and 12 and 36 months. Only able to build consensus when evidence base is sufficiently differentiated.
- Statements still felt overly generalised overall.
- A categorical / homogenised approach cannot ever be put forward as clinically advisable – decisions need to consider the whole patient 'at the coal face' of care.
- Cannot lump all cancers together; e.g. haematological malignancies are immunosuppressing irrespective of stage.
- 'Early stage' – difficult to operationalise in medical records.
- Stage language is also not always appropriate in cancer (e.g. grades) so 'hard and fast' rules based on stage should be avoided - risk is more related to treatment protocol/ cancer type.
- Patients may be untreated due to palliative care, previous non-responsiveness or 'watch and wait' – these are on opposite ends of risk scale, so 'untreated' does not reveal much about risk.
- Pharmacokinetic and pharmacodynamic nature of drug determines how long-term immunosuppression is. A short course of rituximab could still see immunosuppression 5 years later and 5-10mg still viewed as immunosuppressive in CDC.
- Equivalence to 10mg/ 20mg prednisolone was highly criticised.
- Consensus achieved on remission/ resolution – caveating on type of cancer, likelihood of resurgence, treatment received (e.g. bone marrow transplant) and time since remission began. Remission codes are also sparsely used – better to consider time constraining cancer diagnosis.

6. Strengths of the exercise:

- Panellists acknowledged that this is a massive and complicated exercise and congratulated the team – getting to a fine enough resolution on differential risk is a tall order
- This work is extremely valuable for driving hypothesis/insight generation – just not clinical practice until validated
- Panellists enjoyed the exercise overall – background detail was not overwhelming, information provided beforehand was just enough to set the scene
- Short and simple interface – key for retention.
- Impressive panel in terms of geographical footprint and panel calibre.
- Good balance of condition-general and condition-specific experts.
- Enjoyed its iterative nature – seeing the exact data between rounds. Other eDelphis have not provided data, just feedback that consensus was/ wasn't reached, which didn't help for shifting answers.
- Forced panellists out of their comfort zone/ to think about risk in a different way.
- Blind spots of individual panellists covered by wider panel.

7. Weaknesses of the exercise:

- Need to emphasise that these resources are not meant to be used for clinical decision-making for COVID or other disease use cases until they have gone through rigorous validation process (checking if real world data is in lock step with risk expectations of phenotypes). Further refinement may be required before these means of subdividing surveillance data are standardised in data flows.
- Frustration around inability to incorporate medication/ demographic variables that have considerable influence – if not determining role in some circumstances – on risk.
- Overly simplistic interface – inability to incorporate modifying variables e.g. medication/ comorbidities/ layering of immunosuppressive conditions. Survey was overly strict – difficult to convey nuances of expertise. This is problematic given that COVID risk all stands to nuance.

- Diagnosis does not necessarily infer immunosuppression (e.g. specific autoimmune/ autoinflammatory conditions) – diagnosis-based subdivision may incorporate non-immunosuppressed patients if they have not been treated.
- No patient and public involvement – hierarchies should be presented to a lay advisory group for feedback (may be viewed as wholly inappropriate). 'Does this have face validity? Does this look reasonable/ make sense to you?'. Widen pool beyond EULAR PARE for this.
- Panellists felt unable to weigh in on certain topics without referring to the wider literature.
- Issues with recruitment strategy
    - Poor representation of Global South; no representation from patients; oversampling from rheumatological conditions; no representation from private sector; crude approach to just pluck for key decision-making bodies
- Group think concerns e.g. Islet transplantation moving towards upper risk strata after being featured in this position in first phenotype.
- Feeling that COVID is yesterday's story – unsure how helpful these risk phenotypes will really be now that the immunosuppressed are almost universally vaccinated against the disease.
- PPIE efforts are essential but must be handled with great sensitivity – must ensure that press releases do not suggest these hierarchies are confirmed, validated or generalisable to paediatric/ other disease domains as this could be very disturbing to patients and misleading for clinicians.

8. Panellist recommendations:

1. Recommendation to involve PPIE once phenotypes are finalised; discuss study and construction process to allow patients to weigh in with their concerns.
2. Recommendation to publish phenotypes online (open source) to enable 'translations' and enable other international research teams to implement them in their own disease surveillance flows.
3. Recommendation to quantify the expansiveness of the immunosuppressed population – newer estimates are as large as 7-10% of the population.
4. Recommendation to consider Long COVID as an immunosuppressed condition.
5. Recommendation to create two parallel risk axes – one condition based, and one medication based. Highest level eligible for determines allocation and prioritisation. Ideally ability to denote an interaction between the two axes.
6. Recommendation that future exercises have group interaction at start of eDelphi (diamond shape) to provide line of sight into others' thinking and specialisms from the very start. Would have been helpful to leverage the panel to determine questions set, for example.

9. Prospective future consensus exercises:

- Medication risk hierarchy to create parallel assessment tool (diagnosis risk vs medication risk axes)
- Consensus exercise on exact demarcations between immunosuppressed, immunodeficient and immunocompromised – tension between layman synonymity and specialist understanding of idiosyncrasies.
- Similar exercises should be run for other disease use-cases e.g. influenza, RSV, bacterial infections etc; key for pandemic preparedness – given that literature is not sufficiently differentiated, individual expert opinion must be collated
- Consensus exercise on the immunosuppressed patients most likely to experience suboptimal seroconversion after vaccination

Appendix 16: All phenotype drafts

A. All phenotype drafts

DRAFT AFTER ROUND 1:

1. COVID-19 Risk Categorised Phenotype for Adult Immunosuppression:

This is Phenotype 1. Conditions were allocated into Higher Risk or Lower Risk categories based on majority vote. Consensus (*) was achieved when ≥75% of panellists agreed with categorisation. Conditions are listed in descending order of votes for allocation into the Higher Risk category.

Conditions at Higher Risk for Severe COVID-19 Outcomes within the Immunosuppressed Spectrum:
Stem cell transplantation*
Multi-organ transplantation*
Solid organ transplantation*
Haematological malignancies*
Bone marrow transplantation*
Genetic disorders of the immune system (Primary Immunodeficiencies)*
AIDS-defining illness*
Underlying aberrant immunity*
Actively treated malignancies*
Untreated HIV*
Generalised malignancies (metastasis)*
Dialysis*
Islet transplantation
Chronic kidney disease
Down syndrome
Renal autoimmune diseases
Aplastic anemia
Rheumatological disorders
Solid tumours
Asplenia (functional or anatomic)
Pregnancy
Nephrotic syndrome
Neurologic autoimmune disorders
Sickle cell disease
HIV infection (all levels)
Haematologic autoimmune disorders

Conditions at Lower Risk for Severe COVID-19 Outcomes within the Immunosuppressed Spectrum:
Malnutrition
Type 2 Diabetes
Gastrointestinal autoimmune disorders
Burn injuries
Autoimmune skin diseases
Endocrine autoimmune diseases
Anorexia Nervosa
Cerebrospinal fluid leak
Opthamologic autoimmune diseases*
Well-managed HIV*
Cochlear implants*
Stunting*
Chronic stress*

Sleep deprivation*

*achieved ≥75% panel agreement

2. COVID-19 Risk Stratified Phenotype for Adult Immunosuppression:

This is Phenotype 2. Risk strata allocation is mutually exclusive; this ensures that higher risk patients within a certain population (e.g. AIDS-defining illness and untreated HIV) will be separated from other population terms (e.g. well-managed HIV and HIV infection [all levels]) and allocated into the highest risk strata that they are eligible. The strata below are listed in descending level of risk for severe COVID-19 outcomes.

1. Transplantations
2. Haematological and distributed malignancies
3. Inborn errors of immunity, underlying aberrant immunity and acquired immunodeficiency syndrome
4. Solid tumours and treatment protocols
5. Kidney disease and treatment protocols
6. Autoimmune and hyperinflammatory conditions
7. Anemia and asplenia
8. Well-managed HIV
9. Barrier deficits
10. Wider determinants of immunosuppression

<u>Transplantations:</u>
Stem cell transplantation
Multi-organ transplantation
Solid organ transplantation
Bone marrow transplantation
Islet transplantation

<u>Haematological and distributed malignancies:</u>
Haematological malignancies
Generalised malignancies (metastasis)

<u>Inborn errors of immunity, underlying aberrant immunity and acquired immunodeficiency syndrome</u>
Genetic disorders of the immune system (Primary Immunodeficiencies)
Underlying aberrant immunity
AIDS-defining illness
Untreated HIV

<u>Solid tumours and treatment protocols</u>
Solid tumours
Actively treated malignancies

<u>Kidney disease and treatment protocols</u>
Chronic kidney disease
Nephrotic disease
Dialysis

<u>Autoimmune and hyperinflammatory conditions</u>
Rheumatological disorders
Renal autoimmune diseases
Neurologic autoimmune disorders
Haematologic autoimmune disorders
Gastrointestinal autoimmune disorders
Autoimmune skin diseases
Endocrine autoimmune diseases

Opthamologic autoimmune diseases

Anemia and asplenia
Aplastic anemia
Asplenia (functional or anatomic)
Sickle cell disease

Well-managed HIV
Well-managed HIV
HIV infection (all levels)

Barrier defects
Cochlear implant
Cerebrospinal fluid link
Burn injuries

Wider determinants of immunosuppression
Malnutrition
Type 2 Diabetes
Anorexia Nervosa
Stunting
Chronic stress
Sleep deprivation

DRAFT AFTER ROUND 2:

1. COVID-19 Risk Categorised Phenotype for Adult Immunosuppression:

In this round we have chosen to demarcate drug-managed HIV from the wider immunosuppressed phenotype to serve as an Active Control group for subsequent real-world investigations of COVID-19 vaccine benefit-risk in the immunosuppressed. This is based on consistent panel feedback that this group is inappropriate for inclusion in immunosuppressed cohorts and experiences no additional vulnerability for severe COVID-19 outcomes than the immunocompetent. We believe that using drug-managed HIV as an Active Control group in this way would address known issues comparing immunosuppressed with immunocompetent cohorts (vastly different demographics/ vaccine uptake; difficult to identify a truly immunocompetent cohort etc.), but we put this to the panel.

High Risk for Severe COVID-19 Outcomes
Bone marrow transplantation
Haematological Malignancies
Multi-organ transplantation
Solid Organ Transplantation
Stem Cell Transplantation
AIDS-defining Illness
Genetic Diseases (PIDs)
Untreated HIV
Generalised Malignancies (Metastasis)
Underlying Aberrant Immunity
Islet Transplantation
Dialysis
Renal Autoimmune Conditions
Aplastic Anaemia
Solid Tumours

Moderate Risk for Severe COVID-19 Outcomes
Chronic Kidney Disease (Late Stage)
Rheumatologic Autoimmune Conditions

Nephrotic Syndrome
Haematologic Autoimmune Conditions
Sickle Cell Disease
Asplenia
Neurological Autoimmune Conditions
Pregnancy
Gastrointestinal Autoimmune Conditions
Autoimmune Skin Conditions
Endocrine Autoimmune Conditions
Type 2 Diabetes
Burn Injuries
Malnutrition
Ophthalmologic Autoimmune Conditions

Low Risk for Severe COVID-19 Outcomes
Cerebrospinal Fluid Leak
Anorexia Nervosa
Cochlear Implants
Stunting

Active control: Drug-managed HIV

2. COVID-19 Risk Stratified Phenotype for Adult Immunosuppression:

This is Phenotype 2. To ensure this phenotype is both clinically relevant and computerised medical record compatible, it considers the following factors when stratifying the patient spectrum: **1) vulnerability scoring, 2) panellist feedback, 3) population size and 4) common anatomical/ clinical denominators.**

Based on panel instruction, we have chosen to demarcate systemic from single site autoinflammatory conditions in this draft. While it is acknowledged that certain conditions included in the single site autoinflammatory strata have generalised effects on the body, they all have one primary source of damage or dysfunction (e.g. pancreas, thyroid).

For each strata, conditions are listed in descending levels of risk for severe COVID-19 outcomes. Once implemented, risk strata allocation is mutually exclusive; patients eligible for multiple levels are allocated to their highest risk strata.
1. Transplantation
2. Haematological or distributed malignancies
3. Primary immunodeficiencies, unmanaged acquired immunodeficiencies & underlying aberrant immunity
4. Solid tumours
5. Renal disease & dialysis
6. Systemic autoinflammatory conditions
7. Asplenia & Anaemia
8. Single site autoinflammatory conditions
9. Anatomical barrier defects
10. Wider determinants of immunosuppression

Active Control:
Drug-managed HIV

1. Transplantations:

Stem Cell Transplantation
Multi-Organ Transplantation
Bone Marrow Transplantation
Solid Organ Transplantation
Islet Transplantation

2. Haematological or distributed malignancies
Haematological Malignancies
Generalised Malignancies (metastasis)

3. Primary immunodeficiencies, unmanaged acquired immunodeficiencies & underlying aberrant immunity
Genetic disorders of the immune system (Primary Immunodeficiencies)
AIDS-defining Illness
Underlying aberrant immunity
Untreated HIV
Down syndrome

4. Solid tumours

5. Renal Disease and Dialysis
Dialysis
Renal Autoimmune Conditions
Chronic Kidney Disease (Late Stage)
Nephrotic Syndrome

6. Systemic immune-mediated autoinflammatory conditions
Rheumatological autoimmune diseases
Haematological autoimmune diseases

7. Anaemia & asplenia
Aplastic anaemia
Sickle cell disease
Asplenia (functional or anatomic)

8. Single site immune-mediated autoinflammatory conditions
Neurological autoimmune conditions
Gastrointestinal autoimmune conditions
Autoimmune skin conditions
Endocrine autoimmune conditions
Ophthalmological autoimmune conditions

9. Anatomical Barrier Defects
Burn Injuries
Cerebrospinal Fluid Leak
Cochlear Implant

10. Wider determinants of immunosuppression
Pregnancy
Type 2 Diabetes
Malnutrition
Anorexia Nervosa
Stunting

Active Control Group:
Drug-Managed HIV

DRAFT AFTER FINAL DISCUSSION GROUPS:

1. COVID-19 Risk Categorised Phenotype for Adult Immunosuppression:

Upon in-person consultation with the Panel, it became clear that there is widespread discomfort with converting the outcomes of binary 'higher vs lower risk immunosuppressed' consensus building into a three-part, linear model of risk categorisation to be incorporated into disease surveillance data flows (previously 'Phenotype 1'). It cannot be inferred that conditions where consensus wasn't reached represents 'moderate' risk, for example. As such, this data will be reported in our manuscript for clinical interest, but not formalised into a digital phenotype at this moment in time. Instead, a banded approach will be taken to the second phenotype, enabling both granular divisions of immunosuppressed disease surveillance and three-part risk categorisation to support clinical decision-making (subject to real-world validation).

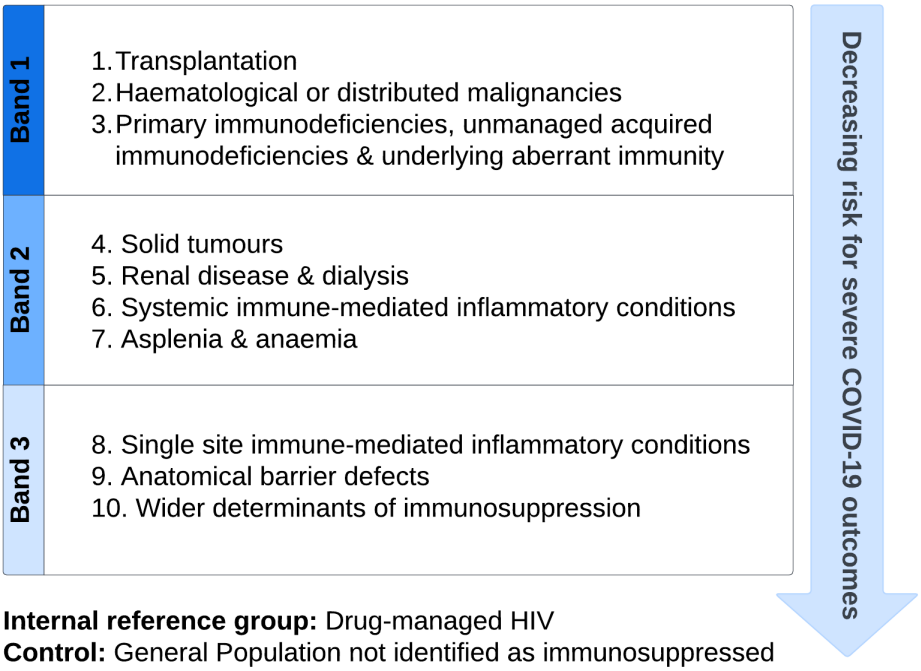
Consensus Higher COVID Risk Immunosuppressed
Bone marrow transplantation
Haematological Malignancies
Multi-organ transplantation
Solid Organ Transplantation
Stem Cell Transplantation
AIDS-defining Illness
Genetic Diseases (PIDs)
Untreated HIV
Generalised Malignancies (Metastasis)
Underlying Aberrant Immunity
Islet Transplantation
Dialysis
Renal Autoimmune Conditions
Aplastic Anaemia
Solid Tumours

No Consensus Reached
Chronic Kidney Disease (Late Stage)
Rheumatologic Autoimmune Conditions
Nephrotic Syndrome
Haematologic Autoimmune Conditions
Sickle Cell Disease
Asplenia
Neurological Autoimmune Conditions
Pregnancy
Gastrointestinal Autoimmune Conditions
Autoimmune Skin Conditions
Endocrine Autoimmune Conditions
Type 2 Diabetes
Burn Injuries
Malnutrition
Ophthalmologic Autoimmune Conditions

Consensus Lower COVID Risk Immunosuppressed
Cerebrospinal Fluid Leak
Anorexia Nervosa
Cochlear Implants
Stunting

The DESTINIES Phenotype: '*Adult immunosuppression, classified by COVID-19 vulnerability*'

Levels are presented in descending vulnerability to severe COVID-19 outcomes compared to the immunocompetent baseline; conditions within each level (operationalised below) are also presented in descending vulnerability. Once implemented, risk level allocation is mutually exclusive; medical records eligible for multiple levels are only allocated to their highest risk level. **Risk banding is currently set at 1-3 (Highest excess vulnerability), 4-7 and 8-10 (Lowest excess vulnerability), though this will be finalised after real-world implementation.**



Internal reference group: Drug-managed HIV
Control: General Population not identified as immunosuppressed

1. Transplantations:

Hematopoietic stem cell transplantation (Bone Marrow/ Stem Cell transplantation)
Multi-Organ Transplantation
Solid Organ Transplantation
Islet Transplantation

2. Haematological or distributed malignancies

Haematological Malignancies
Generalised Malignancies (metastasis)
Medical records with remission codes excluded

3. Primary immunodeficiencies, unmanaged acquired immunodeficiencies & underlying aberrant immunity

Genetic disorders of the immune system (Primary Immunodeficiencies: e.g. SCID)
AIDS-defining Illness (HIV-related conditions including tuberculosis, Kapsi's sarcoma, candidiasis, histoplasmosis, isosporiasis, recurrent pneumonia etc.) & Unmanaged HIV
Underlying aberrant immunity (e.g. graft-vs-host disease, graft rejection, absent or incomplete immune reconstitution, neutropenia ANC, lymphopenia ALC, secondary hypogammaglobinaemia etc.)
Down syndrome

4. Solid tumours

Medical records with remission codes excluded

5. Renal Disease & Dialysis

Dialysis
Renal Autoimmune Conditions (e.g. Lupus nephritis, Glomerulonephritis, IgA nephropathy etc.)
Chronic Kidney Disease (Late Stage, 4+)
Nephrotic Syndrome
Excluding Chronic Kidney Disease < Stage 4

6. Systemic immune-mediated inflammatory conditions

Rheumatological autoimmune diseases (e.g. systemic lupus erythematosus, rheumatoid arthritis, Sjögren's syndrome, idiopathic inflammatory myopathies, ankylosing spondylitis, vasculitides, gout etc.)
Haematological autoimmune diseases (e.g. Evan's syndrome, immune thrombocytopenic purpura, antiphospholipid syndrome, autoimmune neutropenia, VEXAS etc.)
Gastrointestinal autoimmune conditions (e.g. celiac disease, Crohn's disease, ulcerative colitis, autoimmune gastritis, microscopic colitis, autoimmune pancreatitis, autoimmune hepatitis etc.)
Neurological autoimmune conditions (e.g. multiple sclerosis, myasthenia gravis, neuromyelitis optica etc.)

7. Anaemia & asplenia

Severe anaemia (e.g. aplastic anaemia, pernicious anaemia, autoimmune haemolytic anaemia etc.)

Sickle cell disease
Asplenia (functional or anatomic)
Generic/ mild cases of anaemia excluded

8. Single site immune-mediated inflammatory conditions

Autoimmune skin conditions (e.g. psoriasis, dermatitis herpetiformis, vitiligo, pemphigus, scleroderma, dermatomyositis etc.)
Endocrine autoimmune conditions (e.g. Type 1 diabetes mellitus, Hashimoto's thyroiditis, Graves' disease, Addison's disease etc.)
Ophthalmological autoimmune conditions (e.g. Uveitis, Graves' ophthalmopathy etc.)

9. Anatomical Barrier Defects

Severe burn Injuries
Cerebrospinal Fluid Leak
Cochlear Implant
Mild/ moderate burns excluded (< Stage 3)

10. Wider determinants of immunosuppression

Pregnancy (final trimester)
Type 2 Diabetes
Malnutrition (operationalised as anorexia nervosa & stunting)
Excluding pregnancies earlier than 3rd trimester

Internal reference group: Drug-managed HIV
Control: General Population not identified as immunosuppressed

Appendix 17: DESTINIES Final Ratification Data

Statement	Strongly disagree	Strongly disagree %	Slightly disagree	Slightly disagree %	Unsure	Unsure %	Slightly agree	Slightly agree %	Strongly agree	Strongly agree %	Sum disagree %	Sum agree %	Determination
I am happy with this phenotype being trialled within real-world data flows	0	0	1	2.94	1	2.94	10	29.41	22	64.71	2.94	94.12	Agreement
This phenotype is an accurate representation of results from the last round	0	0	0	0	3	8.82	10	29.41	21	61.76	0	91.18	Agreement
This version is an improvement to the last draft	0	0	0	0	2	5.88	15	44.12	17	50	0	94.12	Agreement
I prefer the banded version of this phenotype	3	8.82	1	2.94	5	14.71	15	44.12	10	29.41	11.76	73.53	Contested
The risk banding of this phenotype contains the right levels	1	2.94	2	5.88	3	8.82	17	50	11	32.35	8.82	82.35	Agreement
The levels of this phenotype are presented in the correct order (descending risk for severe COVID outcomes)	0	0	1	2.94	2	5.88	17	50	14	41.18	2.94	91.18	Agreement
Conditions are correctly allocated to phenotype levels	0	0	2	5.88	4	11.76	19	55.88	9	26.47	5.88	82.35	Agreement
Drug-managed HIV is a fair internal reference group	2	5.88	6	17.65	5	14.71	14	41.18	7	20.59	23.53	61.76	Contested

It would be interesting to compare phenotype, internal reference group and healthy control outcomes	0	0	2	5.88	3	8.82	13	38.24	16	47.06	5.88	85.29	Agreement
This phenotype represents a step forward for disease surveillance	0	0	1	2.94	5	14.71	12	35.29	16	47.06	2.94	82.35	Agreement
As a hypothesis generating exercise, it would be interesting to apply this phenotype to subdivide immunosuppressed outcomes for other diseases (seasonal influenza, pneumonia, RSV etc.)	0	0	1	2.94	3	8.82	11	32.35	19	55.88	2.94	88.24	Agreement

Appendix 18: COVAD 1 Country Distribution List & Data Dictionary

COVAD 1 country distribution list

Answer Choices	Responses	
India	14.81%	1608
Turkey	14.01%	1521
Mexico	11.73%	1274
United Kingdom	11.07%	1202
United States	9.35%	1015
Italy	5.57%	605
Lebanon	3.04%	330
Sweden	2.90%	315
Switzerland	2.84%	308
Philippines	2.76%	300
Poland	2.50%	272
Brazil	2.47%	268
Indonesia	1.92%	208
Japan	1.56%	169
Egypt	1.44%	156
Germany	1.41%	153
Australia	1.39%	151
Pakistan	1.24%	135
Bulgaria	1.19%	129
Spain	1.09%	118
Russian Federation	0.68%	74
Bahrain	0.54%	59
Israel	0.51%	55
Canada	0.46%	50
France	0.39%	42
United Arab Emirates	0.32%	35
Bangladesh	0.23%	25
Cyprus	0.17%	18
Argentina	0.15%	16
Austria	0.15%	16
Ireland {Republic}	0.15%	16
Colombia	0.12%	13
Venezuela	0.11%	12
Kazakhstan	0.10%	11
Romania	0.10%	11
Ecuador	0.08%	9
Morocco	0.08%	9
Saudi Arabia	0.08%	9
Portugal	0.07%	8
Singapore	0.07%	8

Chile	0.06%	7
El Salvador	0.06%	6
Finland	0.06%	6
Guatemala	0.06%	7
Honduras	0.06%	6
Bolivia	0.05%	5
Costa Rica	0.05%	5
New Zealand	0.05%	5
Qatar	0.05%	5
Malaysia	0.04%	4
Netherlands	0.04%	4
Norway	0.04%	4
Afghanistan	0.03%	3
Belgium	0.03%	3
Czech Republic	0.03%	3
Greece	0.03%	3
South Africa	0.03%	3
Ukraine	0.03%	3
Albania	0.02%	2
Algeria	0.02%	2
Antigua & Deps	0.02%	2
Azerbaijan	0.02%	2
China	0.02%	2
Dominican Republic	0.02%	2
Iran	0.02%	2
Andorra	0.01%	1
Barbados	0.01%	1
Cape Verde	0.01%	1
Comoros	0.01%	1
Denmark	0.01%	1
Estonia	0.01%	1
Gabon	0.01%	1
Grenada	0.01%	1
Hungary	0.01%	1
Jamaica	0.01%	1
Jordan	0.01%	1
Kenya	0.01%	1
Korea South	0.01%	1
Kuwait	0.01%	1
Libya	0.01%	1
Liechtenstein	0.01%	1
Luxembourg	0.01%	1
Malta	0.01%	1
Micronesia	0.01%	1
Montenegro	0.01%	1
Nigeria	0.01%	1

Oman	0.01%	1
Panama	0.01%	1
Paraguay	0.01%	1
San Marino	0.01%	1
Serbia	0.01%	1
Swaziland	0.01%	1
Taiwan	0.01%	1
Thailand	0.01%	1
Trinidad & Tobago	0.01%	1
Angola	0.00%	0
Armenia	0.00%	0
Bahamas	0.00%	0
Belarus	0.00%	0
Belize	0.00%	0
Benin	0.00%	0
Bhutan	0.00%	0
Bosnia Herzegovina	0.00%	0
Botswana	0.00%	0
Brunei	0.00%	0
Burkina	0.00%	0
Burundi	0.00%	0
Cambodia	0.00%	0
Cameroon	0.00%	0
Central African Rep	0.00%	0
Chad	0.00%	0
Congo	0.00%	0
Congo {Democratic Rep}	0.00%	0
Croatia	0.00%	0
Cuba	0.00%	0
Djibouti	0.00%	0
Dominica	0.00%	0
East Timor	0.00%	0
Equatorial Guinea	0.00%	0
Eritrea	0.00%	0
Ethiopia	0.00%	0
Fiji	0.00%	0
Gambia	0.00%	0
Georgia	0.00%	0
Ghana	0.00%	0
Guinea	0.00%	0
Guinea-Bissau	0.00%	0
Guyana	0.00%	0
Haiti	0.00%	0
Iceland	0.00%	0
Iraq	0.00%	0
Ivory Coast	0.00%	0

Kiribati	0.00%	0
Korea North	0.00%	0
Kosovo	0.00%	0
Kyrgyzstan	0.00%	0
Laos	0.00%	0
Latvia	0.00%	0
Lesotho	0.00%	0
Liberia	0.00%	0
Lithuania	0.00%	0
Macedonia	0.00%	0
Madagascar	0.00%	0
Malawi	0.00%	0
Maldives	0.00%	0
Mali	0.00%	0
Marshall Islands	0.00%	0
Mauritania	0.00%	0
Mauritius	0.00%	0
Moldova	0.00%	0
Monaco	0.00%	0
Mongolia	0.00%	0
Mozambique	0.00%	0
Myanmar, {Burma}	0.00%	0
Namibia	0.00%	0
Nauru	0.00%	0
Nepal	0.00%	0
Nicaragua	0.00%	0
Niger	0.00%	0
Palau	0.00%	0
Papua New Guinea	0.00%	0
Peru	0.00%	0
Rwanda	0.00%	0
St Kitts & Nevis	0.00%	0
St Lucia	0.00%	0
Saint Vincent & the Grenadines	0.00%	0
Samoa	0.00%	0
Sao Tome & Principe	0.00%	0
Senegal	0.00%	0
Seychelles	0.00%	0
Sierra Leone	0.00%	0
Slovakia	0.00%	0
Slovenia	0.00%	0
Solomon Islands	0.00%	0
Somalia	0.00%	0
South Sudan	0.00%	0
Sri Lanka	0.00%	0
Sudan	0.00%	0

Suriname	0.00%	0
Syria	0.00%	0
Tajikistan	0.00%	0
Tanzania	0.00%	0
Togo	0.00%	0
Tonga	0.00%	0
Tunisia	0.00%	0
Turkmenistan	0.00%	0
Tuvalu	0.00%	0
Uganda	0.00%	0
Uruguay	0.00%	0
Uzbekistan	0.00%	0
Vanuatu	0.00%	0
Vatican City	0.00%	0
Vietnam	0.00%	0
Yemen	0.00%	0
Zambia	0.00%	0
Zimbabwe	0.00%	0
	Answered	10859
	Skipped	1847

Spoken languages of COVAD 1 respondents

Language	Number of Complete Responses
English (en)	5446
Turkish (tr)	1762
Hindi (hi)	150
Bengali (bn)	8
Hebrew (he)	56
Tamil (ta)	5
Punjabi (pa)	10
Malay (ms)	3
Marathi (mr)	32
Malayalam (ml)	122
Swedish (sv)	28
Spanish (es)	1181

Filipino (fil)	6
Polish(pl)	301
German (de)	220
Arabic (ar)	212
French (fr)	152
Ukrainian (uk)	1
Urdu (ur)	19
Brazillian Portugese (pt)	204
Japanese (ja)	95
Indonesian	159
Russian (ru)	109
Gujarati (gu)	10
Norwegian (no)	1
Italian (it)	608

COVAD 1 Data Dictionary

Question	Required	Options	Glossary	Validated Scales
Have you received any dose of the COVID-19 vaccine yet?	Yes	a) Yes b) No	Vaccination status	-
Why did you not take the vaccine?	Yes	a. My doctor has advised against it b. Not available to me so far but plan to take vaccine as soon as possible. c. Will not take the vaccine due to long-term safety concern or fear. d. Planning to wait for more time/data regarding safety before I take the vaccine. e. I have scheduled my vaccine, but not received yet. f. Not recommended as I had Covid-19 infection recently. g. I am not sure h. Other (please specify)	Reasons for not vaccinating/Vaccine hesitancy.	-
Did you test positive for COVID-19 (Coronavirus)?	Yes	a) Yes b) No	Laboratory tested COVID-19 positivity	-
When did you test positive for COVID-19 (Coronavirus)?	Yes	Specific date (DD/MM/YY)	Date of positive test for COVID-19	-
How long did your symptoms last (in days)?	Yes	Number (of days)	Duration of symptoms	-
What were your symptoms due to Covid-19 infection?	Yes	a. None (asymptomatic– no symptoms) b. Fever c. Fatigue d. Muscle aches e. Cough f. Breathlessness g. Chest pain h. Diarrhoea i. Headache j. Oral ulcers k. Nausea/vomiting l. Joint pains m. Skin rashes n. Other (please specify)	COVID-19 symptoms	Health Service executive symptoms for COVID-19 https://www2.hse.ie/conditions/covid19/symptoms/overview/ Imperial College NHS COVID-19 checklist https://www.imperial.nhs.uk/~/media/website/patients-and-visitors/covid19-check-list.pdf
Did you require hospitalization or oxygen supplementation due to Covid-19 infection	Yes	a. Yes- Hospitalisation b. Yes- Hospitalisation and Oxygen supplementation	Hospitalisation and Oxygen supplementation requirement	-

		c. No		
Which vaccine did you take?	Yes	a. Pfizer-BioNTech b. Oxford/Astra Zeneca c. Johnson and Johnson (J&J) d. Moderna e. Novavax f. Covishield (Serum Institute India) g. Covaxin (Bharat Biotech) h. Sputnik i. I am not sure which one I received. j. Other (please specify)	Vaccine Brand name	Status of COVID-19 Vaccines within WHO EUL/PQ evaluation process https://extranet.who.int/prequal/sites/default/files/document_files/Status_COVID_VAX_08AUgust2023.pdf
How many doses have you received?	Yes	a. 1 b. 2	Number of vaccine doses received	-
On which date did you received the first dose of the vaccine	Yes	Specific Date (DD/MM/YY)	Date of 1st vaccination	-
Did you experience any minor (mild) symptoms within 7 days of vaccination? (1st or 2nd dose)- choose multiple if more than 1 symptoms. Minor symptoms are the ones that resolve within few days with or without medication	Yes	a. None- I did not develop any symptoms after vaccination b. Injection site (arm) pain and soreness c. Muscle pain in all arms and legs d. Body ache e. Fever f. Chills g. Nausea/Vomiting h. Headache i. Rash j. Fatigue k. Diarrhoea l. Abdominal pain m. High pulse rate or palpitations n. Rise in blood pressure o. Fainting p. Difficulty in breathing q. Dizziness r. Chest pain s. Other (please specify)	Post COVID-19 Vaccination Mild symptoms	CDC criteria https://www.cdc.gov/vaccinesafety/ensuringsafety/sideeffects/index.html
Did you experience any major (severe) symptoms within 7 days of vaccination? (1st or 2nd dose)- choose multiple if more than 1 symptoms.	Yes	a. None b. Anaphylaxis (shock) c. Marked difficulty in breathing d. Tongue swelling or throat closure e. Severe diffuse body rash (hives) f. Required hospitalisation	Post COVID-19 Vaccination Severe symptoms	CDC criteria https://www.cdc.gov/vaccinesafety/ensuringsafety/sideeffects/index.html

		g. Other severe symptoms (please specify)		
Do you have any of following autoimmune conditions?	Yes	a. No autoimmune disease b. Dermatomyositis c. Polymyositis d. Inclusion Body Myositis e. Anti-synthetase syndrome f. Necrotizing myositis g. Juvenile dermatomyositis h. Mixed Connective Tissue Disease (MCTD) i. Overlap Myositis with lupus or Sjogren or Systemic sclerosis or Rheumatoid arthritis j. Systemic Sclerosis (scleroderma) k. Sjogren syndrome l. Rheumatoid Arthritis m. Vasculitis n. Systemic lupus erythematosus (lupus) o. Ankylosing Spondylitis or Psoriatic arthritis p. Crohn's disease or ulcerative colitis (Inflammatory bowel disease/IBD) q. Multiple sclerosis r. Myasthenia gravis s. Pernicious anaemia t. Haemolytic amenia / idiopathic thrombocytopenic purpura (ITP) u. Thyroid (Hypothyroid or hyperthyroid) v. Type 1 Diabetes w. Polymyalgia Rheumatica (PMR) x. Other autoimmune disease (please specify)	Autoimmune Disease	Rheumatic disease list by Stoneybrook Medicine https://www.stonybrookmedicine.edu/patientcare/rheumatology
Who confirmed your autoimmune disease diagnosis?	Yes	a. Rheumatologist b. Neurologist c. Dermatologist d. Haematologist e. Physician/Medicine doctor (internal medicine, Internist) f. Primary care physician (PC), or family doctor or general practioner (GP). g. Other doctor (specify)	Specialisation of Doctor confirming Autoimmune disease diagnosis	-
In which year were you diagnosed with autoimmune disease?	Yes	Year	Year of diagnosis of Autoimmune Disease	-
Did you have any of the following symptoms in 4	Yes	a. I did not have any symptoms b. Rashes c. Muscle weakness	Pre COVID-19 vaccination symptoms due to Autoimmune Disease	-

weeks before (prior to) your 1st dose of Covid-19 vaccine. Mark only significant symptoms that affected your day-to-day life. (multiple answers)		d. Joint pain or swelling in hands e. Joint pain or swelling of other joints f. Raynaud's (blue, or white discolouration with or without pain in the fingers on exposure to cold) g. Fingertip ulcers or pits h. Shortness of breath i. Chest pain j. Difficulty in swallowing k. Fever l. Fatigue m. Dry eyes n. Dry mouth o. Oral or nasal ulcers (sores) p. Skin thickening of hands and other areas (if scleroderma) q. Severe loss of hair or in bald spots r. Headache due to disease s. Active kidney disease from autoimmune disease t. Elevated muscle enzyme in blood (high CK or creatine kinase level) u. Elevated inflammatory markers in blood (high ESR or CRP) v. Other (specify)		
What kind of rashes did you notice?	Yes	a. I don't have any rashes b. Red rash around the eyes c. Red rashes on the knuckles d. Rashes on the knees e. Rashes on the things or/and hips f. Red rash on the cheeks g. Red rash in the V area of the chest h. Red rashes on the outside of arms and/or forearm i. Mechanic's hand (rough, thick scaly skin on the fingers) j. Other k. Other red rashes (specify)	Type of rash	-
If you have swelling in your joints, how many joints are swollen? (do not count joints with bony enlargement/swelling)	Yes	a. I don't have any swollen joints. b. 1-2 swollen joints c. 3-5 swollen joints d. 5 or more swollen joints	Number of swollen joints	-
Were you on any of the	Yes	a. None	Pre COVID-19 vaccination	-

following immunosuppressive medications before (within 4 weeks) of vaccination (1st dose)? (Multiple answers)		b. Methotrexate c. Mycophenolate Mofetil or Mycophenolic acid d. Rituximab e. Azathioprine f. Hydroxychloroquine (HCQS, plaquenil) g. Sulfasalazine h. Leflunomide i. Oral Tacrolimus j. Cyclosporine k. IV Immunoglobulin (IVIg) or Subcutaneous Immunoglobulin (SQIg) l. Cyclophosphamide (Cytoxan) m. Other medicines n. Other biologics (Specify)	immunosuppressive therapy	
Were you on any steroids (prednisone, Medrol, prednisolone, wysolone, omacortil, etc} before (within 4 weeks) of vaccination (1st dose)?	Yes	a. No steroids b. Yes, < 10 mg a day c. Yes, 10 mg - 20 mg a day d. Yes, > 20 mg a day	Pre COVID-19 vaccination steroid therapy	-
Did you require an increase in the dose of any of these immunosuppressant medications, or starting a new immunosuppressant medicine in the 6 months prior to the 1st Covid-19 vaccine ? (multiple answers). **Do NOT include if dose was decrease or medication stopped.**	Yes	a. No b. Steroids c. Methotrexate d. Mycophenolate Mofetil or Mycophenolic acid e. Rituximab f. Azathioprine g. Hydroxychloroquine (HCQS, plaquenil) h. Sulfasalazine i. Leflunomide j. Oral Tacrolimus k. Cyclosporine l. IV Immunoglobulin (IVIg) or Subcutaneous Immunoglobulin (SQIg) m. Cyclophosphamide (Cytoxan) n. Other medications	Pre COVID-19 immunosuppressive drug dose escalation requirement	-
What was the status of your autoimmune disease in 4 weeks (prior to) before 1st dose of Covid-19 vaccine?	Yes	a. My disease was inactive or in remission b. My disease was active but stable and manageable c. My disease was active and improving d. My disease was active and worsening e. I am not sure f. Other (please specify)	Pre COVID-19 vaccination Autoimmune disease status	-
Did you discontinue or hold any	Yes	a. No I continued all medicines as I did before	Pre or Post COVID-19 vaccination	-

of the above immunosuppressive medication (if taking) days or weeks before or after vaccination?		b. Not applicable (not on any of the above immunosuppressive medications) c. Yes	immunosuppressive therapy stoppage	
Which medications did you hold for Covid-19 vaccine? (Multiple answers)	Yes	a. Steroids b. Methotrexate c. Mycophenolate Mofetil or Mycophenolic acid d. Rituximab e. Azathioprine f. Hydroxychloroquine (HCQS, plaquenil) g. Sulfasalazine h. Leflunomide i. Oral Tacrolimus j. Cyclosporine k. IV Immunoglobulin (IVIg) or Subcutaneous Immunoglobulin (SQIg) l. Cyclophosphamide (Cytoxan) m. Biologics n. Other immunosuppressive medicines	Specific immunosuppressant stopped Pre or Post COVID-19 vaccination	-
How long (days) did you hold approximately?	Yes	Number of days	Duration of stoppage of immunosuppressant	-
In general, how would you rate your physical health	Yes	a. Excellent b. Very Good c. Good d. Fair e. Poor	Self-perception of physical health	PROMIS Global Health v 1.2-Global physical health
To what extent are you able to carry out your everyday activities such as walking, climbing stairs, carrying groceries, or moving a chair?	Yes	a. Completely b. Mostly c. Moderately d. A little e. A little f. Not at all	Difficulty with activities of daily living	PROMIS Global Health v 1.2-Global physical health
Please rate your overall level of fatigue (tiredness) in the past 7 days by placing a mark on the line below. Zero (0) is no fatigue and 10 is very severe fatigue.	Yes	Self reporting scale from 0 (no fatigue) to 10 (severe fatigue)	Current level of fatigue (at the time of filling questionnaire)	PROMIS Global Health v 1.2-Global physical health
Please rate your overall level of pain in the past 7 days by placing a mark on the line below. Zero (0) is no pain and 10 is very severe pain.	Yes	Self reporting scale from 0 (no pain) to 10 (severe pain)	Current level of pain(at the time of filling questionnaire)	PROMIS Global Health v 1.2-Global physical health Pain VAS scale
(What is the current status of	Yes	5 point Likert scale	State of Physical function- Part 1 (1)	PROMIS PF-10a

your physical function?-Part 1) Does your health now limit you in doing vigorous activities, such as running, lifting heavy objects, participating in strenuous sports		a. Not at all b. Very little c. Somewhat d. Quite a lot e. Cannot do		
(What is the current status of your physical function?-Part 1) Does your health now limit you in walking more than a mile (1.6km)?	Yes	5 point Likert scale a. Not at all b. Very little c. Somewhat d. Quite a lot e. Cannot do	State of Physical function- Part 1 (2)	PROMIS PF-10a
(What is the current status of your physical function?-Part 1) Does your health now limit you in climbing one flight of stairs?	Yes	5 point Likert scale a. Not at all b. Very little c. Somewhat d. Quite a lot e. Cannot do	State of Physical function-Part 1 (3)	PROMIS PF-10a
(What is the current status of your physical function?-Part 1) Does your health now limit you in lifting or carrying groceries?	Yes	5 point Likert scale a. Not at all b. Very little c. Somewhat d. Quite a lot e. Cannot do	State of Physical function-Part 1 (4)	PROMIS PF-10a
(What is the current status of your physical function?-Part 1) Does your health now limit you in bending, kneeling, or stooping?	Yes	5 point Likert scale a. Not at all b. Very little c. Somewhat d. Quite a lot e. Cannot do	State of Physical function-Part 1 (5)	PROMIS PF-10a
(What is the current status of your physical function?-Part 2) Are you able to do chores such as vacuuming or yard work?	Yes	5 point Likert scale a. Without any difficulty b. With a little difficulty c. With some difficulty d. With much difficulty e. Cannot do	State of Physical function-Part 2 (1)	PROMIS PF-10a
(What is the current status of your physical function?-Part 2) Are you able to dress yourself, including tying shoelaces and buttoning your clothes?	Yes	5 point Likert scale a. Without any difficulty b. With a little difficulty c. With some difficulty d. With much difficulty e. Cannot do	State of Physical function-Part 2 (2)	PROMIS PF-10a
(What is the current status of your physical function?-Part 2)	Yes	5 point Likert scale a. Without any difficulty	State of Physical function-Part 2 (3)	PROMIS PF-10a

Are you able to shampoo your hair?		b. With a little difficulty c. With some difficulty d. With much difficulty e. Cannot do		
(What is the current status of your physical function?-Part 2) Are you able to wash and dry your body?	Yes	5 point Likert scale a. Without any difficulty b. With a little difficulty c. With some difficulty d. With much difficulty e. Cannot do	State of Physical function-Part 2 (4)	PROMIS PF-10a
(What is the current status of your physical function?-Part 2) Are you able to sit on and get up from the toilet?	Yes	5 point Likert scale a. Without any difficulty b. With a little difficulty c. With some difficulty d. With much difficulty e. Cannot do	State of Physical function-Part 2 (5)	PROMIS PF-10a
Which country do you live in?	Yes	Drop down Menu	Country of Residence	-
Gender?	Yes	a. Male b. Female c. Do not wish to disclose	Gender	-
Ethnicity?	Yes	a. Caucasian (White) b. African American or of African origin (Black) c. Asian d. Others (please specify)	Ethnicity	-
Age?	Yes	Specify Age (in years)	Age	-

Appendix 19: Disaggregated reporting of COVID-19 Symptoms and Side Effects

Disaggregated reporting of COVID-19 symptoms by study category (symptoms calculated using total counts reported)

	Overlap	Systemic	Single Organ	Control	Chi² *p-value*
	419	**2522**	**614**	**4175**	
None (asymptomatic – no symptoms)	4	45	13	99	0.114
IRR	0.40	0.75	0.89	/	
Lower CI	0.12	0.52	0.48	/	
Upper CI	0.96	1.06	1.53	/	
p-values	0.07	0.11	0.70		
Fever	44	339	77	539	0.454
IRR	0.81	1.04	0.97	/	
Lower CI	0.59	0.91	0.76	/	
Upper CI	1.09	1.19	1.22	/	
p-values	0.19	0.56	0.81		
Fatigue	63	383	93	697	0.418
IRR	0.90	0.91	0.91	/	
Lower CI	0.69	0.80	0.73	/	
Upper CI	1.16	1.03	1.12	/	
p-values	0.43	0.14	0.38		
Muscle aches	53	307	75	563	0.495
IRR	0.94	0.90	0.91	/	
Lower CI	0.70	0.78	0.71	/	
Upper CI	1.23	1.04	1.14	/	
p-values	0.66	0.15	0.42		
Cough	40	269	62	442	0.905
IRR	0.90	1.01	0.95	/	
Lower CI	0.64	0.86	0.72	/	
Upper CI	1.23	1.17	1.23	/	
p-values	0.53	0.92	0.73		
Breathlessness	32	177	29	207	0.002
IRR	1.54	1.42	0.95	/	
Lower CI	1.04	1.16	0.63	/	

Upper CI	2.20	1.73	1.38	/	
p-values	0.02 *	0.00 *	0.81		
Chest pain	19	111	22	142	0.193
IRR	1.33	1.29	1.05	/	
Lower CI	0.80	1.01	0.65	/	
Upper CI	2.10	1.66	1.61	/	
p-value	0.24	0.04 *	0.82		
Diarrhoea	19	135	34	182	0.26
IRR	1.04	1.23	1.27	/	
Lower CI	0.63	0.98	0.87	/	
Upper CI	1.62	1.53	1.81	/	
p-value	0.87	0.07	0.20		
Headache	52	275	67	513	0.375
IRR	1.01	0.89	0.89	/	
Lower CI	0.75	0.77	0.68	/	
Upper CI	1.33	1.03	1.14	/	
p-value	0.95	0.11	0.36		
Oral ulcers	3	28	9	21	0.013
IRR	1.42	2.21	2.91	/	
Lower CI	0.34	1.26	1.27	/	
Upper CI	4.13	3.93	6.17	/	
p-value	0.57	0.01 *	0.01 *		
Nausea/vomiting	15	76	19	104	0.412
IRR	1.44	1.21	1.24	/	
Lower CI	0.80	0.90	0.74	/	
Upper CI	2.39	1.62	1.98	/	
p-value	0.19	0.21	0.39		
Joint pains	43	189	50	311	0.277
IRR	1.38	1.01	1.09	/	
Lower CI	0.99	0.84	0.80	/	
Upper CI	1.87	1.20	1.46	/	
p-value	0.05 *	0.95	0.56		
Skin rashes	10	34	20	48	0.002
IRR	2.08	1.17	2.83	/	
Lower CI	0.99	0.75	1.65	/	
Upper CI	3.93	1.81	4.70	/	

p-value	0.04 *	0.48	<0.001 *		
Other (please specify)	22	154	44	307	0.145
IRR	0.71	0.83	0.97	/	
Lower CI	0.45	0.68	0.70	/	
Upper CI	1.07	1.01	1.32	/	
p-value	0.13	0.06	0.87		

Disaggregated reporting of mild COVID-19 vaccine side effects by study category (side effects calculated using total counts reported)

	Overlap	**Systemic**	**Single Organ**	**Control**	**Chi² *p-values***
	1911	2918	11336	12483	
None	111	301	1065	1363	<0.001
IRR	0.53	0.94	0.86	/	
Lower CI	0.44	0.83	0.79	/	
Upper CI	0.64	1.07	0.93	/	
p-value	<0.001 *	0.37	<0.001 *	/	
Injection site (arm) pain and soreness	453	749	2942	3373	0.038
IRR	0.88	0.95	0.96	/	
Lower CI	0.79	0.88	0.91	/	
Upper CI	0.97	1.03	1.01	/	
p-value	0.01 *	0.20	0.11	/	
Muscle pain in all arms and legs	112	161	706	836	0.084
IRR	0.88	0.82	0.93	/	
Lower CI	0.71	0.69	0.84	/	
Upper CI	1.06	0.97	1.03	/	
p-value	0.19	0.02 *	0.16	/	
Body ache	169	258	976	1181	0.174
IRR	0.93	0.93	0.91	/	
Lower CI	0.79	0.82	0.84	/	
Upper CI	1.09	1.07	0.99	/	
p-value	0.41	0.32	0.03 *	/	
Fever	126	214	838	1094	<0.001
IRR	0.75	0.84	0.84	/	
Lower CI	0.62	0.72	0.77	/	
Upper CI	0.90	0.97	0.92	/	

p-value	0.00 *	0.02 *	0.00 *	/	
Chills	114	180	653	676	0.37
IRR	1.10	1.14	1.06	/	
Lower CI	0.90	0.96	0.96	/	
Upper CI	1.34	1.34	1.18	/	
p-value	0.34	0.12	0.26	/	
Nausea/Vomiting	66	62	291	236	<0.001
IRR	1.83	1.12	1.36	/	
Lower CI	1.38	0.84	1.14	/	
Upper CI	2.38	1.48	1.61	/	
p-value	<0.001 *	0.41	<0.001 *	/	
Headache	210	288	1139	1186	0.218
IRR	1.16	1.04	1.06	/	
Lower CI	1.00	0.91	0.97	/	
Upper CI	1.34	1.18	1.15	/	
p-value	0.05	0.56	0.18	/	
Rash	24	16	98	51	<0.001
IRR	3.07	1.34	2.12	/	
Lower CI	1.86	0.74	1.52	/	
Upper CI	4.94	2.30	2.99	/	
p-value	<0.001 *	0.31	<0.001 *	/	
Fatigue	254	338	1395	1446	0.128
IRR	1.15	1.00	1.06	/	
Lower CI	1.00	0.89	0.99	/	
Upper CI	1.31	1.12	1.14	/	
p-value	0.04 *	1.00	0.11	/	
Diarrhoea	21	47	151	127	0.028
IRR	1.08	1.58	1.31	/	
Lower CI	0.66	1.12	1.03	/	
Upper CI	1.67	2.20	1.66	/	
p-value	0.74	0.01 *	0.03 *	/	
Abdominal pain	27	22	108	78	0.001
IRR	2.26	1.21	1.52	/	
Lower CI	1.43	0.73	1.14	/	
Upper CI	3.45	1.90	2.05	/	
p-value	0.00	0.44	0.00	/	

	*		*		
High pulse rate or palpitations	34	48	130	127	0.005
IRR	1.75	1.62	1.13	/	
Lower CI	1.18	1.15	0.88	/	
Upper CI	2.52	2.24	1.44	/	
p-value	0.00	0.00	0.34	/	
	*	*			
Rise in blood pressure	16	19	50	51	0.058
IRR	2.05	1.59	1.08	/	
Lower CI	1.13	0.92	0.73	/	
Upper CI	3.51	2.65	1.60	/	
p-value	0.01	0.08	0.70	/	
	*				
Fainting	6	9	12	21	0.053
IRR	1.87	1.83	0.63	/	
Lower CI	0.68	0.80	0.30	/	
Upper CI	0.68	3.88	1.26	/	
p-value	0.18	0.13	0.20	/	
Difficulty in breathing	11	19	54	53	0.428
IRR	1.36	1.53	1.12	/	
Lower CI	0.67	0.89	0.77	/	
Upper CI	2.49	2.54	1.64	/	
p-value	0.36	0.11	0.55	/	
Dizziness	60	83	261	228	<0.001
IRR	1.72	1.56	1.26	/	
Lower CI	1.28	1.20	1.06	/	
Upper CI	2.27	1.99	1.51	/	
p-value	0.00	0.00	0.01	/	
	*	*	*		
Chest pain	16	17	84	63	0.081
IRR	1.66	1.15	1.47	/	
Lower CI	0.93	0.65	1.06	/	
Upper CI	2.80	1.93	2.04	/	
p-value	0.07	0.60	0.02	/	
			*		
Other (please specify)	81	87	383	284	<0.001
IRR	1.86	1.27	1.49	/	
Lower CI	1.45	0.99	1.27	/	
Upper CI	1.31	1.03	1.66	/	
p-value	<0.001	0.03	<0.001	/	

Mild vaccine side effects by vaccine type

Vaccine type	None %	Injection site (arm) pain and soreness %	Muscle pain in all arms and legs %	Body ache %	Fever %	Chills %	Nausea/ Vomiting %	Headache %	Rash %	Fatigue %
Adenoviral	8.36	19.90	7.26	11.71	12.71	7.17	2.37	10.28	0.53	10.47
Inactivated	23.97	28.96	4.81	7.12	3.78	1.56	1.45	7.98	0.37	10.15
mRNA	6.75	30.04	6.12	7.66	5.82	5.89	2.47	10.14	0.83	13.62
Mix	2.25	16.85	6.74	11.24	7.87	6.74	5.62	7.87	0.00	16.85
Protein subunit	12.90	25.81	6.45	6.45	3.23	0.00	3.23	9.68	3.23	16.13
Unsure	13.53	17.65	8.82	12.35	10.00	3.53	1.76	10.00	0.59	8.24

	Diarrhoea %	Abdominal pain %	High pulse rate or palpitations %	Rise in blood pressure %	Fainting %	Difficulty in breathing %	Dizziness %	Chest pain %	Other (please specify) %	Total reported
Adenoviral	1.13	0.89	1.29	0.44	0.17	0.43	2.21	0.57	2.10	9928
Inactivated	0.84	0.37	0.68	0.47	0.12	0.35	2.45	0.65	3.92	4285
mRNA	1.37	0.90	1.25	0.50	0.18	0.52	2.12	0.64	3.18	14136
Mix	1.12	3.37	2.25	0.00	0.00	3.37	2.25	1.12	4.49	89
Protein subunit	0.00	3.23	0.00	0.00	0.00	0.00	3.23	3.23	3.23	31
Unsure	1.76	0.00	2.35	1.18	0.00	1.18	3.53	1.18	2.35	170

Mild vaccine side effects by vaccine type and study category

Category	Vaccine type	None %	Injection site pain %	Muscle pain %	Body ache %	Fever %	Chills %	Nausea / Vomiting %	Headache %	Rash %	Fatigue %
Overlap	Adenoviral	6.01	16.61	7.12	10.44	9.97	6.01	4.43	11.71	1.11	12.34
	Inactivated	14.29	27.55	9.18	10.20	2.04	2.04	2.04	10.20	1.02	10.20
	mRNA	5.03	27.43	5.03	7.81	5.03	6.34	2.95	10.59	1.39	14.32
	Mix	0.00	8.33	0.00	8.33	8.33	8.33	8.33	8.33	0.00	8.33
	Unsure	5.88	23.53	0.00	11.76	11.76	0.00	5.88	17.65	0.00	0.00
Systemic	Adenoviral	9.13	19.78	6.89	11.00	10.70	7.21	2.84	10.48	0.59	11.27
	Inactivated	21.02	26.21	6.08	8.77	5.19	1.79	1.52	8.05	0.89	7.33
	mRNA	7.50	29.57	5.85	7.16	5.89	5.66	2.57	10.13	1.03	13.73
	Mix	1.85	14.81	7.41	11.11	9.26	5.56	5.56	9.26	0.00	18.52
	Protein subunit	14.29	28.57	0.00	0.00	0.00	0.00	7.14	14.29	0.00	21.43
	Unsure	23.53	23.53	11.76	17.65	2.94	0.00	0.00	11.76	0.00	5.88
Single	Adenoviral	11.62	18.84	5.61	11.72	12.22	7.92	1.30	9.62	0.30	8.92
	Inactivated	18.43	26.96	5.46	8.87	1.71	1.02	2.39	9.22	0.00	14.68
	mRNA	8.02	29.71	5.41	7.02	5.28	6.09	2.61	10.13	0.81	12.74
	Protein subunit	16.67	33.33	16.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Unsure	8.33	16.67	8.33	16.67	16.67	0.00	0.00	16.67	0.00	8.33
Control	Adenoviral	7.35	20.69	7.94	12.46	14.81	7.14	1.94	10.07	0.46	9.90

	Inactivated	26.08	30.33	4.07	6.16	3.49	1.51	1.30	7.74	0.18	10.81
	mRNA	5.77	31.37	6.96	8.49	6.09	6.01	2.18	10.04	0.46	13.59
	Mix	4.35	26.09	8.70	13.04	4.35	8.70	4.35	4.35	0.00	17.39
	Protein subunit	9.09	18.18	9.09	18.18	9.09	0.00	0.00	9.09	9.09	18.18
	Unsure	12.15	14.95	9.35	10.28	11.21	5.61	1.87	7.48	0.93	10.28
Category	Vaccine type	Diarrhoea %	Abdominal pain %	High pulse rate or palpitations %	Rise in blood pressure %	Fainting %	Difficulty in breathing %	Dizziness %	Chest pain %	Other (please specify) %	Total
Overlap	Adenoviral	1.58	1.74	1.90	0.63	0.47	0.32	3.96	0.47	3.16	632
	Inactivated	1.02	0.00	0.00	2.04	0.00	0.00	1.02	1.02	6.12	98
	mRNA	0.87	1.30	1.82	0.78	0.26	0.69	2.69	0.95	4.69	1152
	Mix	0.00	8.33	0.00	0.00	0.00	8.33	8.33	8.33	8.33	12
	Unsure	0.00	0.00	5.88	5.88	0.00	0.00	11.76	0.00	0.00	17
Systemic	Adenoviral	1.03	1.19	1.16	0.38	0.11	0.49	2.40	0.54	2.81	3701
	Inactivated	1.16	0.54	0.72	0.54	0.00	0.36	3.67	1.16	5.01	1118
	mRNA	1.54	0.87	1.20	0.47	0.12	0.48	2.01	0.80	3.41	6415
	Mix	1.85	1.85	3.70	0.00	0.00	1.85	1.85	0.00	5.56	54
	Protein subunit	0.00	7.14	0.00	0.00	0.00	0.00	0.00	0.00	7.14	14
	Unsure	0.00	0.00	0.00	0.00	0.00	0.00	2.94	0.00	0.00	34
Single	Adenoviral	1.30	0.60	2.00	0.70	0.50	0.90	2.81	1.00	2.10	998
	Inactivated	0.68	0.68	0.34	1.02	0.00	0.68	2.73	1.02	4.10	293

	mRNA	1.99	0.87	1.68	0.56	0.25	0.50	2.80	0.19	3.36	1609
	Protein subunit	0.00	0.00	0.00	0.00	0.00	0.00	16.67	16.67	0.00	6
	Unsure	0.00	0.00	0.00	0.00	0.00	0.00	8.33	0.00	0.00	12
Control	Adenoviral	1.11	0.59	1.15	0.41	0.11	0.30	1.68	0.52	1.37	4597
	Inactivated	0.72	0.29	0.72	0.32	0.18	0.32	1.98	0.40	3.39	2776
	mRNA	1.07	0.85	1.03	0.44	0.22	0.54	1.90	0.52	2.48	4960
	Mix	0.00	4.35	0.00	0.00	0.00	4.35	0.00	0.00	0.00	23
	Protein subu nit	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11
	Unsure	2.80	0.00	2.80	0.93	0.00	1.87	1.87	1.87	3.74	107

Disaggregated reporting of major COVID-19 vaccine side effects by study category (side effects calculated using total counts reported)

	Overlap	Systemic	Single Organ	Control	Chi² *p-value*
	706	**4794**	**1239**	**5586**	
None	639	4556	1168	5453	0.202
IRR	0.93	0.97	0.97	/	
Lower CI	0.85	0.94	0.91	/	
Upper CI	1.01	1.01	0.94	/	
p-value	0.07	0.18	0.28	/	
Anaphylaxis	3	13	2	4	0.039
IRR	5.93	3.79	2.25	/	
Lower CI	1.17	1.34	0.31	/	
Upper CI	26.92	13.45	11.55	/	
p-value	0.02	0.02	0.35	/	
	*	*			
Marked difficulty breathing	12	26	8	31	0.020
IRR	3.06	0.98	1.16	/	
Lower CI	1.51	0.58	0.50	/	
Upper CI	5.81	1.64	2.41	/	
p-value	0.00	0.93	0.70	/	
	*				
Tongue swelling	7	16	6	6	<0.001
IRR	9.23	3.11	4.51	/	
Lower CI	3.07	1.28	1.41	/	
Upper CI	28.67	8.66	14.41	/	
p-value	<0.001	0.02	0.01	/	
	*	*	*		
Severe rash	8	31	11	16	0.002
IRR	3.96	2.26	3.10	/	
Lower CI	1.60	1.25	1.40	/	
Upper CI	8.99	4.23	6.62	/	
p-value	0.00	0.01	0.00	/	
	*	*	*		
Required hospitalisation	3	20	10	13	0.039
IRR	1.83	1.79	3.47	/	
Lower CI	0.42	0.90	1.48	/	
Upper CI	5.66	3.69	7.88	/	
p-value	0.35	0.10	0.00	/	
			*		
Other severe symptoms	34	132	34	63	<0.001
IRR	4.27	2.44	2.43	/	

Lower CI	2.79	1.82	1.59	/
Upper CI	6.43	3.32	3.67	/
p-value	<0.001	<0.001	<0.001	/
	*	*	*	

Major vaccine side effects by vaccine type

Vaccine type	None %	Anaphylaxis %	Marked difficulty in breathing %	Tongue swelling or throat closure %	Severe diffuse body rash (hives) %	Required hospitalisation %	Other severe symptoms (please specify) %	Total
Adenoviral	95.31	0.21	0.56	0.43	0.75	0.43	2.30	3734
Inactivated	98.04	0.04	0.45	0.08	0.23	0.30	0.86	2659
mRNA	95.66	0.21	0.62	0.26	0.50	0.34	2.41	5805
Mix	64.00	4.00	16.00	0.00	4.00	0.00	12.00	25
Protein subunit	81.25	0.00	12.50	0.00	0.00	6.25	0.00	16
Unsure	90.67	0.00	2.67	2.67	2.67	1.33	0.00	75

Major vaccine side effects by vaccine type and study category

Category	Vaccine type	None %	Anaphylaxis (shock) %	Marked difficulty in breathing %	Tongue swelling or throat closure %	Severe diffuse body rash (hives) %	Required hospitalisation %	Other severe symptoms (please specify) %	Total
Overlap	Adenoviral	89.81	0.93	0.93	1.85	2.31	0.00	4.17	216
	Inactivated	91.67	0.00	4.17	0.00	0.00	0.00	4.17	48
	mRNA	91.24	0.23	1.38	0.69	0.46	0.69	5.30	434
	Mix	50.00	0.00	50.00	0.00	0.00	0.00	0.00	2
	Unsure	66.67	0.00	16.67	0.00	16.67	0.00	0.00	6

Systemic	Adenoviral	94.77	0.14	0.35	0.64	0.56	0.49	3.04	1416
	Inactivated	96.11	0.16	0.47	0.16	0.93	0.62	1.56	642
	mRNA	95.17	0.33	0.56	0.22	0.56	0.33	2.82	2691
	Mix	56.25	6.25	12.50	0.00	6.25	0.00	18.75	16
	Protein subunit	87.50	0.00	12.50	0.00	0.00	0.00	0.00	8
	Unsure	95.24	0.00	0.00	0.00	4.76	0.00	0.00	21
Single	Adenoviral	93.69	0.25	0.51	0.00	1.52	1.01	3.03	396
	Inactivated	98.76	0.00	0.62	0.62	0.00	0.00	0.00	161
	mRNA	94.20	0.15	0.60	0.45	0.74	0.60	3.27	672
	Protein subunit	50.00	0.00	25.00	0.00	0.00	25.00	0.00	4
	Unsure	50.00	0.00	0.00	33.33	0.00	16.67	0.00	6
Control	Adenoviral	96.83	0.18	0.70	0.18	0.53	0.29	1.29	1706
	Inactivated	98.84	0.00	0.33	0.00	0.00	0.22	0.61	1808
	mRNA	97.76	0.05	0.55	0.15	0.35	0.20	0.95	2008
	Mix	85.71	0.00	14.29	0.00	0.00	0.00	0.00	7
	Protein subunit	100.00	0.00	0.00	0.00	0.00	0.00	0.00	4
	Unsure	97.62	0.00	2.38	0.00	0.00	0.00	0.00	42

Appendix 20: Multivariate Regressions for the Likelihood of i) Reporting Hospitalisation for COVID-19 and ii) Reporting a Vaccine Side Effect

Multivariate Logistic Regression Analysis of Factors Influencing Likelihood of Reporting COVID-19 Vaccine Side Effects: Model 1*

Study Category	Variable Category	Variable	Coefficient	Std Error	z value	OR	Lower CI	Upper CI	p value	sig
Control	Intercept	(Intercept)	2.97	0.15	19.47	19.53	14.48	26.35	0.00	*
	Age	Age	-0.02	0.00	-9.13	0.98	0.97	0.98	0.00	*
	Gender (Ref = Female)	Do not wish to disclose	0.17	0.48	0.36	1.19	0.46	3.06	0.72	
		Male	-0.49	0.07	-6.71	0.61	0.53	0.71	0.00	*
	Ethnicity (Ref = Caucasian)	African American or of African origin (Black)	-0.43	0.37	-1.15	0.65	0.31	1.35	0.25	
		Asian	0.24	0.09	2.81	1.28	1.08	1.51	0.01	*
		Do not wish to disclose	-0.02	0.14	-0.18	0.98	0.75	1.27	0.86	
		Hispanic	1.56	0.14	11.33	4.77	3.64	6.25	0.00	*
		Native American/Indigenous/Pacific Islander	0.92	0.56	1.66	2.51	0.85	7.46	0.10	
		Other (please specify)	0.21	0.16	1.35	1.24	0.91	1.68	0.18	
	Country economic status (Ref = Higher)	Lower	-1.26	0.11	-11.82	0.29	0.23	0.35	0.00	*
Overlap	Intercept	(Intercept)	3.66	0.54	6.84	38.94	13.64	111.14	0.00	*

	Age	Age	-0.03	0.01	-3.71	0.97	0.95	0.98	0.00	*
	Gender (Ref = Female)	Do not wish to disclose	-1.76	1.26	-1.40	0.17	0.01	2.03	0.16	
		Male	-0.97	0.34	-2.89	0.38	0.20	0.73	0.00	*
		African American or of African origin (Black)	-0.90	1.11	-0.81	0.41	0.05	3.56	0.42	
		Asian	0.33	0.44	0.75	1.40	0.58	3.33	0.45	
		Do not wish to disclose	-0.60	0.55	-1.09	0.55	0.19	1.61	0.27	
		Hispanic	0.22	0.50	0.44	1.25	0.47	3.32	0.66	
		Native American/Indigenous/Pacific Islander	-0.38	1.19	-0.32	0.68	0.07	7.10	0.75	
		Other (please specify)	0.44	0.82	0.54	1.55	0.31	7.74	0.59	
	Country economic status (Ref = Higher)	Lower	-0.69	0.36	-1.91	0.50	0.25	1.02	0.06	
Systemic	Intercept	(Intercept)	3.81	0.19	20.08	45.35	31.25	65.81	0.00	*
	Age	Age	-0.04	0.00	-12.60	0.96	0.96	0.97	0.00	*
	Gender (Ref = Female)	Do not wish to disclose	12.62	216.25	0.06	302038.57	0.00	Inf	0.95	
		Male	-0.70	0.10	-7.21	0.50	0.41	0.60	0.00	*
	Ethnicity (Ref = Caucasian)	African American or of African origin (Black)	-0.41	0.30	-1.38	0.67	0.37	1.19	0.17	
		Asian	0.18	0.12	1.51	1.20	0.95	1.53	0.13	
		Do not wish to disclose	0.70	0.23	3.05	2.01	1.28	3.15	0.00	*
		Hispanic	0.99	0.21	4.76	2.68	1.79	4.03	0.00	*
		Native American/Indigenous/Pacific Islander	1.44	1.04	1.38	4.23	0.55	32.72	0.17	
		Other (please specify)	-0.16	0.22	-0.74	0.85	0.55	1.31	0.46	

	Country economic status (Ref = Higher)	Lower	-1.25	0.11	-10.99	0.29	0.23	0.36	0.00	*
Single	Intercept	(Intercept)	3.48	0.39	9.02	32.57	15.28	69.42	0.00	*
	Age	Age	-0.04	0.01	-5.98	0.96	0.95	0.98	0.00	*
	Gender (Ref = Female)	Do not wish to disclose	-0.93	0.75	-1.25	0.39	0.09	1.70	0.21	
		Male	-0.73	0.17	-4.18	0.48	0.34	0.68	0.00	*
	Ethnicity (Ref = Caucasian)	African American or of African origin (Black)	1.05	1.13	0.93	2.86	0.31	25.97	0.35	
		Asian	-0.16	0.26	-0.64	0.85	0.51	1.40	0.52	
		Do not wish to disclose	0.33	0.49	0.68	1.39	0.54	3.59	0.50	
		Hispanic	1.53	0.44	3.46	4.61	1.94	10.96	0.00	*
		Native American/Indigenous/Pacific Islander	12.04	535.41	0.02	168940.84	0.00	Inf	0.98	
		Other (please specify)	0.76	0.52	1.47	2.14	0.78	5.87	0.14	
	Country economic status (Ref = Higher)	Lower	-0.74	0.25	-2.97	0.48	0.29	0.78	0.00	*
IMID	Intercept	(Intercept)	3.77	0.18	21.00	43.49	30.58	61.84	0.00	*
	Category (Ref = Single Organ)	Overlap	0.24	0.14	1.71	1.27	0.97	1.66	0.09	
		Systemic	-0.03	0.09	-0.34	0.97	0.82	1.16	0.74	
	Age	age	-0.04	0.00	-15.03	0.96	0.96	0.97	0.00	*
	Gender (Ref = Female)	Do not wish to disclose	-0.08	0.56	-0.13	0.93	0.31	2.78	0.89	
		Male	-0.73	0.08	-9.04	0.48	0.41	0.57	0.00	*
	Ethnicity (Ref = Caucasian)	African American or of African origin (Black)	-0.36	0.27	-1.32	0.70	0.41	1.19	0.19	
		Asian	0.12	0.11	1.13	1.13	0.92	1.39	0.26	
		Do not wish to disclose	0.51	0.19	2.66	1.67	1.14	2.44	0.01	*

		Hispanic	1.02	0.17	5.86	2.78	1.97	3.91	0.00	*
		Native American/Indigenous/Pacific Islander	0.91	0.75	1.21	2.49	0.57	10.93	0.23	
		Other (please specify)	0.06	0.19	0.31	1.06	0.73	1.55	0.76	
	Country economic status (Ref = Higher)	Lower	-1.10	0.10	-11.22	0.33	0.28	0.40	0.00	*
Whole	Intercept	(Intercept)	3.24	0.11	30.26	25.65	20.79	31.65	0.00	*
	Category (Ref = Control)	Overlap	0.31	0.12	2.54	1.37	1.07	1.74	0.01	*
		Single	0.04	0.09	0.41	1.04	0.87	1.24	0.68	
		Systemic	0.06	0.06	1.06	1.07	0.95	1.20	0.29	
	Age	age	-0.03	0.00	-17.46	0.97	0.97	0.97	0.00	*
	Gender (Ref = Female)	Do not wish to disclose	0.06	0.37	0.16	1.06	0.52	2.18	0.87	
		Male	-0.60	0.05	-11.20	0.55	0.49	0.61	0.00	*
	Ethnicity (Ref = Caucasian)	African American or of African origin (Black)	-0.36	0.22	-1.65	0.70	0.45	1.07	0.10	
		Asian	0.23	0.07	3.53	1.26	1.11	1.44	0.00	*
		Do not wish to disclose	0.17	0.11	1.52	1.18	0.95	1.47	0.13	
		Hispanic	1.41	0.11	13.01	4.09	3.31	5.05	0.00	*
		Native American/Indigenous/Pacific Islander	0.96	0.45	2.14	2.61	1.09	6.28	0.03	*
		Other (please specify)	0.15	0.12	1.25	1.16	0.92	1.48	0.21	
	Country economic status (Ref = Higher)	Lower	-1.15	0.07	-16.85	0.32	0.28	0.36	0.00	*

Model 1: incorporating age, sex, ethnicity, country economic status and – where relevant – study category*

Multivariate Logistic Regression Analysis of Factors Influencing Likelihood of Reporting COVID-19 Vaccine Side Effects: Model 2*

Study Category	Variable Category	Variable	Coefficient	Std Error	z value	OR	Lower CI	Upper CI	p value	sig
Control	Intercept	(Intercept)	2.70	0.16	16.46	14.91	10.81	20.57	0.00	*
	Age	age	-0.02	0.00	-9.48	0.98	0.97	0.98	0.00	*
	Gender (Ref = Female)	Do not wish to disclose	0.15	0.48	0.31	1.16	0.45	3.01	0.75	
		Male	-0.47	0.07	-6.39	0.62	0.54	0.72	0.00	*
	Ethnicity (Ref = Caucasian)	African American or of African origin (Black)	-0.36	0.38	-0.95	0.70	0.33	1.46	0.34	
		Asian	0.22	0.09	2.53	1.25	1.05	1.49	0.01	*
		Do not wish to disclose	-0.09	0.14	-0.63	0.92	0.70	1.20	0.53	
		Hispanic	1.55	0.14	11.16	4.69	3.58	6.16	0.00	*
		Native American/Indigenous/Pacific Islander	0.83	0.56	1.49	2.30	0.77	6.87	0.14	
		Other (please specify)	0.18	0.16	1.11	1.19	0.87	1.62	0.27	
	Country economic status (Ref = Higher)	Lower	-1.27	0.11	-11.84	0.28	0.23	0.35	0.00	*
	Health status (Ref = Excellent)	Fair	0.86	0.19	4.54	2.36	1.63	3.43	0.00	*
		Good	0.54	0.10	5.31	1.71	1.41	2.09	0.00	*
		Poor	0.76	0.45	1.68	2.15	0.88	5.23	0.09	
		Very good	0.31	0.09	3.35	1.36	1.14	1.63	0.00	*
	Physical status (Ref = Completely)	A little	0.07	0.27	0.25	1.07	0.63	1.82	0.81	
		Moderately	-0.12	0.15	-0.79	0.89	0.66	1.19	0.43	

		Mostly	0.13	0.11	1.18	1.13	0.92	1.39	0.24	
		Not at all	-0.28	0.27	-1.06	0.75	0.45	1.27	0.29	
Overlap	Intercept	(Intercept)	3.46	0.94	3.68	31.91	5.03	202.28	0.00	*
	Age	Age	-0.03	0.01	-3.05	0.97	0.96	0.99	0.00	*
	Gender (Ref = Female)	Do not wish to disclose	-1.60	1.30	-1.23	0.20	0.02	2.57	0.22	
		Male	-1.00	0.35	-2.85	0.37	0.19	0.73	0.00	*
	Ethnicity (Ref = Caucasian)	African American or of African origin (Black)	-0.77	1.12	-0.69	0.46	0.05	4.18	0.49	
		Asian	0.37	0.45	0.82	1.45	0.60	3.51	0.42	
		Do not wish to disclose	-0.58	0.56	-1.03	0.56	0.19	1.69	0.30	
		Hispanic	0.16	0.51	0.32	1.18	0.43	3.20	0.75	
		Native American/Indigenous/Pacific Islander	-0.71	1.19	-0.59	0.49	0.05	5.08	0.55	
		Other (please specify)	0.61	0.84	0.72	1.84	0.35	9.62	0.47	
	Country economic status (Ref = Higher)	Lower	-0.66	0.37	-1.78	0.52	0.25	1.07	0.08	
	Health status (Ref = Excellent)	Fair	0.38	0.78	0.49	1.47	0.32	6.72	0.62	
		Good	0.07	0.75	0.09	1.07	0.24	4.69	0.93	
		Poor	0.16	0.84	0.19	1.17	0.22	6.13	0.85	
		Very good	-0.10	0.79	-0.13	0.90	0.19	4.23	0.90	
	Physical status (Ref = Completely)	A little	-0.57	0.39	-1.45	0.56	0.26	1.22	0.15	
		Moderately	-0.07	0.35	-0.19	0.94	0.47	1.85	0.85	
		Mostly	0.26	0.35	0.73	1.29	0.65	2.57	0.46	

		Not at all	-1.17	0.64	-1.83	0.31	0.09	1.09	0.07	
	Non-steroidal medication (Ref = No)	Receiving non-steroidal medications	-0.17	0.29	-0.57	0.85	0.48	1.50	0.57	
	Steroids (Ref = No)	Receiving steroids	-0.04	0.24	-0.16	0.96	0.60	1.55	0.87	
Systemic	Intercept	(Intercept)	3.11	0.25	12.26	22.45	13.65	36.93	0.00	*
	Age	Age	-0.04	0.00	-12.11	0.96	0.96	0.97	0.00	*
	Gender (Ref = Female)	Do not wish to disclose	12.80	216.64	0.06	360956.73	0.00	Inf	0.95	
		Male	-0.72	0.10	-7.22	0.49	0.40	0.59	0.00	*
	Ethnicity (Ref = Caucasian)	African American or of African origin (Black)	-0.38	0.30	-1.26	0.69	0.38	1.23	0.21	
		Asian	0.13	0.13	0.98	1.13	0.88	1.46	0.33	
		Do not wish to disclose	0.61	0.23	2.61	1.84	1.16	2.92	0.01	*
		Hispanic	0.82	0.21	3.90	2.27	1.50	3.42	0.00	*
		Native American/Indigenous/Pacific Islander	1.23	1.04	1.18	3.41	0.44	26.42	0.24	
		Other (please specify)	-0.21	0.22	-0.92	0.81	0.53	1.26	0.36	
	Country economic status (Ref = Higher)	Lower	-1.05	0.12	-8.79	0.35	0.28	0.44	0.00	*
	Health status (Ref = Excellent)	Fair	1.15	0.19	6.02	3.15	2.17	4.57	0.00	*
		Good	0.83	0.17	4.86	2.30	1.65	3.23	0.00	*
		Poor	1.08	0.24	4.49	2.96	1.84	4.75	0.00	*
		Very good	0.78	0.18	4.33	2.18	1.53	3.10	0.00	*
	Physical status (Ref = Completely)	A little	-0.56	0.16	-3.54	0.57	0.42	0.78	0.00	*
		Moderately	-0.37	0.12	-2.96	0.69	0.54	0.88	0.00	*

		Mostly	-0.08	0.11	-0.66	0.93	0.74	1.16	0.51	
		Not at all	-0.63	0.23	-2.74	0.53	0.34	0.84	0.01	*
	Non-steroidal medication (Ref = No)	Receiving non-steroidal medications	0.01	0.10	0.11	1.01	0.82	1.24	0.91	
		NA	0.00	0.41	0.00	1.00	0.45	2.22	1.00	
	Steroids (Ref = No)	Receiving steroids	-0.19	0.09	-2.14	0.83	0.69	0.98	0.03	*
		NA	-0.74	0.78	-0.95	0.48	0.10	2.20	0.34	
Single	Intercept	(Intercept)	2.71	0.49	5.59	15.09	5.82	39.12	0.00	*
	Age	Age	-0.03	0.01	-5.07	0.97	0.96	0.98	0.00	*
	Gender (Ref = Female)	Do not wish to disclose	-1.00	0.76	-1.32	0.37	0.08	1.62	0.19	
		Male	-0.72	0.18	-4.04	0.49	0.34	0.69	0.00	*
	Ethnicity (Ref = Caucasian)	African American or of African origin (Black)	0.87	1.12	0.78	2.40	0.27	21.64	0.44	
		Asian	-0.15	0.26	-0.58	0.86	0.51	1.44	0.56	
		Do not wish to disclose	0.25	0.50	0.51	1.29	0.49	3.40	0.61	
		Hispanic	1.43	0.45	3.20	4.20	1.75	10.09	0.00	*
		Native American/Indigenous/Pacific Islander	12.14	535.41	0.02	187199.85	0.00	Inf	0.98	
		Other (please specify)	0.66	0.52	1.27	1.93	0.70	5.34	0.20	
	Country economic status (Ref = Higher)	Lower	-0.64	0.27	-2.41	0.53	0.31	0.89	0.02	*
	Health status (Ref = Excellent)	Fair	1.06	0.34	3.14	2.89	1.49	5.59	0.00	*
		Good	0.99	0.30	3.34	2.70	1.51	4.85	0.00	*
		Poor	0.19	0.45	0.43	1.21	0.50	2.93	0.67	

		Very good	0.48	0.29	1.65	1.62	0.91	2.87	0.10	
	Physical status (Ref = Completely)	A little	-0.40	0.30	-1.32	0.67	0.37	1.21	0.19	
		Moderately	-0.36	0.28	-1.31	0.70	0.41	1.20	0.19	
		Mostly	-0.01	0.25	-0.05	0.99	0.61	1.60	0.96	
		Not at all	-0.24	0.36	-0.66	0.79	0.39	1.60	0.51	
	Non-steroidal medication (Ref = No)	Receiving non-steroidal medications	0.27	0.21	1.27	1.31	0.87	1.97	0.20	
		NA	0.24	0.57	0.42	1.27	0.41	3.90	0.68	
	Steroids (Ref = No)	Receiving steroids	-0.43	0.31	-1.41	0.65	0.35	1.18	0.16	
IMID	Intercept	(Intercept)	3.07	0.22	14.18	21.47	14.06	32.81	0.00	*
	Category (Ref = Single Organ)	Overlap	0.17	0.15	1.13	1.18	0.88	1.58	0.26	
		Systemic	-0.10	0.10	-0.92	0.91	0.74	1.11	0.36	
	Age	age	-0.04	0.00	-13.82	0.96	0.96	0.97	0.00	*
	Gender (Ref = Female)	Do not wish to disclose	-0.06	0.56	-0.11	0.94	0.31	2.80	0.91	
		Male	-0.71	0.08	-8.64	0.49	0.42	0.58	0.00	*
	Ethnicity (Ref = Caucasian)	African American or of African origin (Black)	-0.32	0.27	-1.15	0.73	0.43	1.25	0.25	
		Asian	0.09	0.11	0.78	1.09	0.88	1.35	0.44	
		Do not wish to disclose	0.44	0.20	2.24	1.55	1.06	2.28	0.03	*
		Hispanic	0.87	0.18	4.91	2.38	1.68	3.36	0.00	*
		Native American/Indigenous/Pacific Islander	0.74	0.75	0.98	2.09	0.48	9.17	0.33	
		Other (please specify)	0.01	0.20	0.05	1.01	0.69	1.48	0.96	

	Country economic status (Ref = Higher)	Lower	-0.94	0.10	-9.20	0.39	0.32	0.48	0.00	*
	Health status (Ref = Excellent)	Fair	1.09	0.16	6.94	2.97	2.19	4.04	0.00	*
		Good	0.83	0.14	5.85	2.29	1.74	3.02	0.00	*
		Poor	0.88	0.20	4.48	2.42	1.64	3.56	0.00	*
		Very good	0.66	0.15	4.53	1.94	1.46	2.59	0.00	*
	Physical status (Ref = Completely)	A little	-0.53	0.13	-4.17	0.59	0.46	0.76	0.00	*
		Moderately	-0.33	0.11	-3.12	0.72	0.58	0.88	0.00	*
		Mostly	-0.05	0.10	-0.50	0.95	0.79	1.15	0.62	
	Non-steroidal medication (Ref = No)	Receiving non-steroidal medications	0.06	0.09	0.68	1.06	0.90	1.26	0.49	
		NA	0.03	0.40	0.08	1.03	0.47	2.28	0.94	
	Steroids (Ref = No)	Receiving steroids	-0.20	0.08	-2.46	0.82	0.70	0.96	0.01	*
		NA	-0.01	0.58	-0.02	0.99	0.31	3.11	0.99	
Whole	Intercept	(Intercept)	2.77	0.44	6.38	16.03	6.83	37.63	0.00	*
	Category (Ref = Control)	Overlap	0.27	0.44	0.61	1.30	0.55	3.06	0.54	
		Single	0.06	0.42	0.14	1.06	0.47	2.41	0.89	
		Systemic	0.03	0.42	0.07	1.03	0.45	2.35	0.95	
	Age	age	-0.03	0.00	-16.81	0.97	0.97	0.97	0.00	*
	Gender (Ref = Female)	Do not wish to disclose	0.05	0.37	0.13	1.05	0.51	2.15	0.90	
		Male	-0.59	0.05	-10.78	0.56	0.50	0.62	0.00	*
	Ethnicity (Ref = Caucasian)	African American or of African origin (Black)	-0.31	0.22	-1.39	0.74	0.48	1.13	0.16	
		Asian	0.23	0.07	3.41	1.26	1.10	1.44	0.00	*

	Do not wish to disclose	0.11	0.11	1.02	1.12	0.90	1.39	0.31	
	Hispanic	1.34	0.11	12.35	3.83	3.10	4.75	0.00	*
	Native American/Indigenous/Pacific Islander	0.87	0.45	1.95	2.39	0.99	5.75	0.05	
	Other (please specify)	0.12	0.12	0.99	1.13	0.89	1.44	0.32	
Country economic status (Ref = Higher)	Lower	-1.09	0.07	-15.67	0.34	0.29	0.39	0.00	*
Health status (Ref = Excellent)	Fair	0.85	0.10	8.24	2.34	1.91	2.86	0.00	*
	Good	0.61	0.08	7.56	1.83	1.57	2.15	0.00	*
	Poor	0.64	0.15	4.19	1.90	1.41	2.56	0.00	*
	Very good	0.41	0.08	5.23	1.50	1.29	1.75	0.00	*
Physical status (Ref = Completely)	A little	-0.40	0.11	-3.75	0.67	0.54	0.82	0.00	*
	Moderately	-0.23	0.08	-2.80	0.79	0.67	0.93	0.01	*
	Mostly	0.06	0.07	0.91	1.07	0.93	1.22	0.36	
	Not at all	-0.50	0.15	-3.40	0.61	0.46	0.81	0.00	*
Non-steroidal medication (Ref = No)	Receiving non-steroidal medications	0.06	0.09	0.73	1.06	0.90	1.26	0.46	
	NA	-0.02	0.40	-0.05	0.98	0.45	2.15	0.96	
Steroids (Ref = No)	Receiving steroids	-0.21	0.08	-2.64	0.81	0.70	0.95	0.01	*
	NA	0.06	0.58	0.10	1.06	0.34	3.27	0.92	

Model 2: incorporating age, sex, ethnicity, country economic status, health status, medication status and – where relevant – study category*

Multivariate Logistic Regression Analysis of Factors Influencing Likelihood of Reporting COVID-19 Vaccine Side Effects: Model 3*

Study Category	Variable Category	Variable	Coefficient	Std Error	z value	OR	Lower CI	Upper CI	p value	sig
Control	Intercept)	(Intercept)	1.85	0.42	4.40	6.39	2.80	14.60	<0.001	*
	Age	age	-0.04	0.00	-14.02	0.96	0.95	0.97	<0.001	*
	Gender (Ref = Female)	Do not wish to disclose	0.17	0.50	0.34	1.19	0.44	3.17	0.731	
		Male	-0.56	0.08	-7.23	0.57	0.49	0.66	<0.001	*
	Ethnicity (Ref = Caucasian)	African American or of African origin (Black)	-0.66	0.42	-1.57	0.52	0.23	1.18	0.116	
		Asian	0.02	0.10	0.22	1.02	0.85	1.23	0.824	
		Do not wish to disclose	-0.07	0.14	-0.46	0.94	0.71	1.24	0.643	
		Hispanic	0.83	0.15	5.57	2.30	1.72	3.09	<0.001	*
		Native American/Indigenous/Pacific Islander	0.24	0.57	0.42	1.27	0.41	3.92	0.673	
		Other (please specify)	0.20	0.16	1.25	1.23	0.89	1.69	0.212	
	Country economic status (Ref = Higher)	Lower	-0.62	0.12	-5.10	0.54	0.42	0.68	<0.001	*
		Fair	1.08	0.20	5.44	2.96	2.00	4.37	<0.001	*
		Good	0.75	0.11	6.96	2.11	1.71	2.60	<0.001	*
		Poor	0.98	0.48	2.05	2.66	1.04	6.80	0.041	*
		Very good	0.50	0.10	5.10	1.64	1.36	1.99	<0.001	*
	Physical status (Ref = Completely)	A little	0.04	0.29	0.13	1.04	0.59	1.82	0.899	
		Moderately	-0.12	0.16	-0.76	0.89	0.65	1.21	0.448	

		Mostly	0.17	0.11	1.53	1.18	0.95	1.47	0.125	
		Not at all	-0.05	0.28	-0.19	0.95	0.55	1.65	0.852	
	Vaccine dose (Ref = 2)	1	0.09	0.10	0.87	1.09	0.90	1.33	0.384	
	Vaccine type (Ref = Unsure)	Adenoviral	1.51	0.40	3.75	4.54	2.06	10.00	<0.001	*
		Inactivated virus	0.02	0.40	0.06	1.02	0.47	2.24	0.955	
		Mixed schedule	1.65	1.20	1.38	5.22	0.50	54.74	0.168	
		RNA	1.67	0.40	4.12	5.29	2.39	11.70	<0.001	*
		Protein subunit	12.35	206.19	0.06	230760.79	0.00	Inf	0.952	
Overlap	Intercept)	(Intercept)	3.70	1.58	2.35	40.62	1.85	894.02	0.019	*
	Age	age	-0.03	0.01	-3.29	0.97	0.95	0.99	0.001	*
	Gender (Ref = Female)	Do not wish to disclose	-2.09	1.38	-1.52	0.12	0.01	1.84	0.129	
		Male	-0.99	0.36	-2.76	0.37	0.18	0.75	0.006	*
	Ethnicity (Ref = Caucasian)	African American or of African origin (Black)	-0.72	1.13	-0.64	0.49	0.05	4.45	0.524	
		Asian	0.28	0.47	0.59	1.32	0.52	3.35	0.554	
		Do not wish to disclose	-0.66	0.59	-1.11	0.52	0.16	1.65	0.267	
		Hispanic	-0.10	0.53	-0.19	0.91	0.32	2.55	0.851	
		Native American/Indigenous/Pacific Islander	-0.48	1.20	-0.40	0.62	0.06	6.52	0.690	
		Other (please specify)	0.52	0.86	0.60	1.67	0.31	9.00	0.548	
	Country economic status (Ref = Higher)	Lower	0.03	0.46	0.07	1.03	0.42	2.56	0.943	
	Health status (Ref = Excellent)	Fair	0.36	0.80	0.46	1.44	0.30	6.87	0.649	

		Good	0.13	0.77	0.16	1.13	0.25		5.14	0.871	
		Poor	0.09	0.86	0.10	1.09	0.20		5.94	0.920	
		Very good	-0.08	0.80	-0.10	0.92	0.19		4.47	0.921	
	Physical status (Ref = Completely)	A little	-0.64	0.42	-1.54	0.52	0.23		1.19	0.123	
		Moderately	-0.22	0.36	-0.59	0.81	0.40		1.64	0.552	
		Mostly	0.23	0.36	0.63	1.26	0.62		2.56	0.531	
		Not at all	-0.98	0.66	-1.48	0.38	0.10		1.38	0.140	
	Non-steroidal medications (Ref = No)	Receiving non-steroidal medications	0.27	0.37	0.72	1.30	0.63		2.68	0.470	
	Steroids (Ref = No)	Receiving steroids	-0.02	0.25	-0.08	0.98	0.60		1.60	0.933	
	Vaccine dose (Ref = 2)	1	-0.32	0.26	-1.20	0.73	0.44		1.22	0.231	
	Vaccine type (Ref = Unsure)	Adenoviral	-0.51	1.26	-0.41	0.60	0.05		7.05	0.685	
		Inactivated virus	-1.15	1.29	-0.89	0.32	0.03		3.99	0.373	
		Mixed schedule	12.50	620.50	0.02	268189.03	0.00	Inf		0.984	
		RNA	-0.07	1.25	-0.06	0.93	0.08		10.85	0.953	
	Discontinued medications (Ref = Yes)	No	-0.56	0.36	-1.54	0.57	0.28		1.16	0.123	
	Symptoms prior to vaccination (Ref = No)	Yes	0.4103	0.2684	1.529	0.1263	1.5073		0.8908	2.5506	
		NA	-16.2104	882.7435	-0.0184	0.9853	0		0	Inf	
	Discontinued medications (Ref = Yes)	NA	0.43	0.57	0.75	1.54	0.50		4.72	0.453	
Systemic	Intercept	(Intercept)	2.24	0.62	3.62	9.37	2.79		31.41	<0.001	*
	Age	Age	-0.04	0.00	-12.10	0.96	0.96		0.97	<0.001	*

Gender (Ref = Female)	Do not wish to disclose	12.44	213.62	0.06	252780.98	0.00	Inf	0.954	
	Male	-0.69	0.10	-6.90	0.50	0.41	0.61	<0.001	*
Ethnicity (Ref = Caucasian)	African American or of African origin (Black)	-0.27	0.32	-0.87	0.76	0.41	1.41	0.384	
	Asian	0.27	0.13	2.00	1.30	1.01	1.69	0.046	
	Do not wish to disclose	1.02	0.25	4.12	2.77	1.70	4.50	<0.001	*
	Hispanic	0.65	0.21	3.05	1.92	1.26	2.91	0.002	*
	Native American/Indigenous/Pacific Islander	1.10	1.05	1.06	3.02	0.39	23.40	0.291	
	Other (please specify)	-0.18	0.22	-0.81	0.83	0.54	1.29	0.417	
Country economic status (Ref = Higher)	Lower	-0.70	0.13	-5.17	0.50	0.38	0.65	<0.001	*
Health status (Ref = Excellent)	Fair	1.05	0.20	5.36	2.86	1.95	4.19	<0.001	*
	Good	0.80	0.18	4.54	2.23	1.58	3.15	<0.001	*
	Poor	0.88	0.25	3.54	2.41	1.48	3.92	<0.001	*
	Very good	0.81	0.18	4.41	2.25	1.57	3.22	<0.001	*
Physical status (Ref = Completely)	A little	-0.50	0.16	-3.04	0.61	0.44	0.84	0.002	*
	Moderately	-0.37	0.13	-2.95	0.69	0.54	0.88	0.003	*
	Mostly	-0.09	0.12	-0.79	0.91	0.73	1.15	0.432	
	Not at all	-0.41	0.24	-1.71	0.67	0.42	1.06	0.088	
Non-steroidal medications (Ref = No)	Receiving non-steroidal medications	0.19	0.13	1.47	1.21	0.94	1.56	0.142	
	NA	0.20	0.41	0.48	1.22	0.54	2.75	0.630	
Steroids (Ref = No)	Receiving steroids	-0.19	0.09	-2.13	0.82	0.69	0.98	0.033	*

		NA	-0.43	0.88	-0.49	0.65	0.12	3.66	0.625	
	Vaccine dose (Ref = 2)	1	0.00	0.10	0.03	1.00	0.83	1.21	0.978	
	Vaccine type (Ref = Unsure)	Adenoviral	0.26	0.54	0.48	1.30	0.45	3.77	0.634	
		Inactivated virus	-0.36	0.55	-0.65	0.70	0.24	2.05	0.514	
		Mixed schedule	1.61	1.21	1.33	5.00	0.46	53.87	0.185	
		RNA	0.63	0.55	1.14	1.87	0.64	5.46	0.254	
		Protein subunit	-0.27	1.16	-0.23	0.77	0.08	7.42	0.818	
	Discontinued medications (Ref = Yes)	No	0.07	0.12	0.58	1.07	0.85	1.34	0.559	
		NA	0.45	0.19	2.40	1.57	1.09	2.27	0.016	*
	Symptoms prior to vaccination (Ref = No)	Yes	0.35	0.09	3.80	1.41	1.18	1.69	<0.001	*
		NA	-0.42	0.37	-1.14	0.65	0.32	1.36	0.255	
Single	Intercept	(Intercept)	15.98	1027.58	0.02	8703458.96	0.00	Inf	0.988	
	Age	Age	-0.04	0.01	-5.62	0.96	0.95	0.97	<0.001	*
	Gender (Ref = Female)	Do not wish to disclose	-0.94	0.76	-1.23	0.39	0.09	1.74	0.217	
		Male	-0.70	0.19	-3.80	0.49	0.34	0.71	<0.001	*
	Ethnicity (Ref = Caucasian)	African American or of African origin (Black)	0.65	1.13	0.58	1.92	0.21	17.47	0.561	
		Asian	0.08	0.28	0.29	1.08	0.63	1.87	0.771	
		Do not wish to disclose	0.34	0.51	0.68	1.41	0.52	3.83	0.499	
		Hispanic	1.08	0.47	2.32	2.96	1.18	7.40	0.021	*
		Native American/Indigenous/Pacific Islander	13.22	1455.40	0.01	551272.14	0.00	Inf	0.993	

	Other (please specify)	0.86	0.53	1.63	2.35	0.84		6.59	0.103	
Country economic status (Ref = Higher)	Lower	-0.04	0.30	-0.13	0.96	0.53		1.73	0.894	
Health status (Ref = Excellent)	Fair	1.15	0.36	3.22	3.14	1.57		6.31	0.001	*
	Good	1.05	0.31	3.36	2.85	1.55		5.26	0.001	*
	Poor	0.20	0.47	0.42	1.22	0.49		3.06	0.673	
	Very good	0.54	0.30	1.77	1.71	0.94		3.10	0.077	
Physical status (Ref = Completely)	A little	-0.46	0.32	-1.45	0.63	0.34		1.17	0.146	
	Moderately	-0.51	0.29	-1.73	0.60	0.34		1.07	0.084	
	Mostly	-0.05	0.25	-0.18	0.95	0.58		1.57	0.855	
	Not at all	-0.35	0.38	-0.93	0.70	0.33		1.48	0.353	
Non-steroidal medications (Ref = No)	Receiving non-steroidal medications	0.23	0.24	0.96	1.26	0.79		2.01	0.336	
	NA	0.26	1.14	0.23	1.29	0.14		12.04	0.822	
Steroids (Ref = No)	Receiving steroids	-0.49	0.32	-1.51	0.62	0.33		1.15	0.130	
Vaccine dose (Ref = 2)	1	0.05	0.20	0.25	1.05	0.71		1.55	0.803	
Vaccine type (Ref = Unsure)	Adenoviral	-14.19	1027.58	-0.01	0.00	0.00	Inf		0.989	
	Inactivated virus	-14.93	1027.58	-0.01	0.00	0.00	Inf		0.988	
	RNA	-13.23	1027.58	-0.01	0.00	0.00	Inf		0.990	
	Protein subunit	0.24	1306.46	0.00	1.27	0.00	Inf		1.000	
Discontinued medications (Ref = Yes)	No	0.51	0.51	1.00	1.66	0.61		4.49	0.318	
	NA	0.44	0.52	0.85	1.56	0.56		4.35	0.395	

	Symptoms prior to vaccination (Ref = No)	Yes	0.40	0.20	2.03	1.49	1.01	2.18	0.043	*
		NA	-0.39	1.00	-0.39	0.68	0.10	4.79	0.698	
IMID	Intercept	(Intercept)	2.44	0.53	4.59	11.46	4.04	32.49	<0.001	*
	Category (Ref = Single Organ)	Overlap	0.16	0.15	1.05	1.17	0.87	1.57	0.292	
		Systemic	-0.08	0.11	-0.74	0.92	0.75	1.14	0.457	
	Age	Age	-0.04	0.00	-14.27	0.96	0.96	0.97	<0.001	*
	Gender (Ref = Female)	Do not wish to disclose	-0.29	0.56	-0.52	0.75	0.25	2.25	0.606	
		Male	-0.70	0.08	-8.44	0.50	0.42	0.58	<0.001	*
	Ethnicity (Ref = Caucasian)	African American or of African origin (Black)	-0.24	0.29	-0.83	0.79	0.45	1.39	0.406	
		Asian	0.22	0.11	1.97	1.25	1.00	1.56	0.048	
		Do not wish to disclose	0.77	0.21	3.78	2.17	1.45	3.24	<0.001	*
		Hispanic	0.66	0.18	3.68	1.94	1.36	2.75	<0.001	*
		Native American/Indigenous/Pacific Islander	0.65	0.76	0.85	1.91	0.43	8.46	0.394	
		Other (please specify)	0.06	0.20	0.31	1.06	0.72	1.57	0.755	
	Country economic status (Ref = Higher)	Lower	-0.51	0.12	-4.38	0.60	0.48	0.76	<0.001	*
	Health status (Ref = Excellent)	Fair	1.05	0.16	6.56	2.87	2.10	3.93	<0.001	*
		Good	0.84	0.14	5.83	2.32	1.75	3.09	<0.001	*
		Poor	0.78	0.20	3.87	2.18	1.47	3.23	<0.001	*
		Very good	0.72	0.15	4.83	2.06	1.54	2.76	<0.001	*

	Physical status (Ref = Completely)	A little	-0.50	0.13	-3.82	0.61	0.47	0.78	<0.001	*
		Moderately	-0.36	0.11	-3.31	0.70	0.57	0.86	0.001	*
		Mostly	-0.06	0.10	-0.63	0.94	0.77	1.14	0.527	
		Not at all	-0.46	0.18	-2.48	0.63	0.44	0.91	0.013	*
	Non-steroidal medications (Ref = No)	Receiving non-steroidal medications	0.17	0.10	1.65	1.19	0.97	1.46	0.099	
		NA	0.18	0.41	0.44	1.20	0.54	2.67	0.657	
	Steroids (Ref = No)	Receiving steroids	-0.21	0.08	-2.57	0.81	0.69	0.95	0.010	*
		NA	0.18	0.67	0.27	1.20	0.32	4.50	0.788	
	Vaccine dose (Ref = 2)	1	-0.01	0.08	-0.17	0.99	0.84	1.16	0.861	
	Vaccine type (Ref = Unsure)	Adenoviral	0.05	0.47	0.10	1.05	0.42	2.65	0.919	
		Inactivated virus	-0.59	0.48	-1.23	0.56	0.22	1.41	0.218	
		Mixed schedule	1.57	1.17	1.34	4.79	0.49	47.08	0.179	
		RNA	0.52	0.47	1.10	1.69	0.67	4.27	0.270	
		Protein subunit	0.23	1.00	0.23	1.26	0.18	9.01	0.818	
	Discon	No	0.04	0.11	0.39	1.04	0.85	1.28	0.699	
		NA	0.29	0.15	1.97	1.34	1.00	1.79	0.049	
	Symptoms prior to vaccination (Ref = No)	Yes	0.35	0.08	4.53	1.42	1.22	1.65	<0.001	*
		NA	-0.48	0.34	-1.40	0.62	0.32	1.21	0.160	
Whole	Intercept	(Intercept)	2.01	0.54	3.69	7.44	2.56	21.59	<0.001	*
	Category (Ref = Control)	Overlap	-0.02	0.44	-0.05	0.98	0.41	2.31	0.960	
		Single	-0.21	0.42	-0.51	0.81	0.36	1.84	0.610	

	Systemic	-0.23	0.42	-0.55	0.79	0.35	1.81	0.582	
Age	Age	-0.04	0.00	-19.91	0.96	0.96	0.97	<0.001	*
Gender (Ref = Female)	Do not wish to disclose	-0.02	0.37	-0.05	0.98	0.47	2.04	0.957	
	Male	-0.61	0.06	-10.96	0.54	0.49	0.60	<0.001	*
Ethnicity (Ref = Caucasian)	African American or of African origin (Black)	-0.31	0.24	-1.29	0.74	0.46	1.17	0.198	
	Asian	0.19	0.07	2.74	1.21	1.06	1.40	0.006	*
	Do not wish to disclose	0.30	0.12	2.59	1.35	1.08	1.69	0.010	*
	Hispanic	0.82	0.11	7.18	2.27	1.81	2.84	<0.001	*
	Native American/Indigenous/Pacific Islander	0.52	0.46	1.14	1.68	0.69	4.11	0.253	
	Other (please specify)	0.18	0.13	1.40	1.19	0.93	1.52	0.160	
Country economic status (Ref = Higher)	Lower	-0.48	0.08	-6.03	0.62	0.53	0.72	<0.001	*
Health status (Ref = Excellent)	Fair	0.93	0.11	8.77	2.55	2.07	3.14	<0.001	*
	Good	0.74	0.08	8.87	2.09	1.77	2.45	<0.001	*
	Poor	0.63	0.16	4.03	1.88	1.38	2.56	<0.001	*
	Very good	0.55	0.08	6.83	1.73	1.48	2.02	<0.001	*
Physical status (Ref = Completely)	A little	-0.32	0.11	-2.90	0.72	0.58	0.90	0.004	*
	Moderately	-0.24	0.09	-2.80	0.79	0.67	0.93	0.005	*
	Mostly	0.08	0.07	1.16	1.09	0.94	1.25	0.244	
	Not at all	-0.26	0.15	-1.71	0.77	0.57	1.04	0.087	
Non-steroidal medications (Ref = No)	Receiving non-steroidal medications	0.18	0.10	1.70	1.20	0.97	1.47	0.088	

	NA	0.13	0.41	0.32	1.14	0.51	2.55	0.746	
Steroids (Ref = No)	Receiving steroids	-0.22	0.08	-2.67	0.80	0.68	0.94	0.008	*
	NA	0.18	0.67	0.27	1.20	0.32	4.46	0.789	
Vaccine dose (Ref = 2)	1	0.08	0.06	1.27	1.08	0.96	1.22	0.204	
Vaccine type (Ref = Unsure)	Adenoviral	0.79	0.31	2.57	2.20	1.21	4.01	0.010	*
	Inactivated virus	-0.33	0.31	-1.08	0.72	0.39	1.31	0.278	
	Mixed schedule	1.80	0.82	2.18	6.04	1.20	30.38	0.029	*
	RNA	1.16	0.31	3.78	3.20	1.75	5.84	<0.001	*
	Protein subunit	1.03	0.90	1.14	2.81	0.48	16.51	0.252	
Discontinued medications (Ref = Yes)	No	0.05	0.11	0.50	1.05	0.86	1.30	0.620	
	NA	0.31	0.15	2.12	1.37	1.02	1.83	0.034	*
Symptoms prior to vaccination (Ref = No)	Yes	0.27	0.08	3.59	1.31	1.13	1.52	<0.001	*
	NA	-0.51	0.34	-1.51	0.60	0.31	1.17	0.132	

Model 3: incorporating age, sex, ethnicity, country economic status, health status, medication status, vaccine dose, pre-vaccine symptoms and – where relevant – study category*

Multivariate Logistic Regression Analysis of Factors Influencing Likelihood of Hospitalisation for COVID-19: Model 1*

Study Category	Variable Category	Variable	Coefficient	Std Error	z value	OR	Lower CI	Upper CI	p value	sig
Control	Intercept	(Intercept)	-5.19	0.67	-7.68	0.01	0.00	0.02	<0.001	*
	Age	Age	0.03	0.01	3.12	1.03	1.01	1.05	0.002	*
	Gender (Ref = Female)	Do not wish to disclose	-12.60	720.46	-0.02	0.00	0.00	Inf	0.986	
		Male	0.72	0.26	2.73	2.05	1.22	3.42	0.006	*
	Ethnicity (Ref = Caucasian)	African American or of African origin (Black)	1.26	1.20	1.05	3.53	0.34	37.11	0.293	
		Asian	0.48	0.33	1.47	1.62	0.85	3.09	0.141	
		Do not wish to disclose	0.20	0.59	0.34	1.22	0.38	3.88	0.737	
		Hispanic	-0.27	0.41	-0.66	0.77	0.35	1.70	0.512	
		Native American/Indigenous/Pacific Islander	1.08	1.13	0.95	2.93	0.32	26.96	0.342	
		Other (please specify)	0.13	0.58	0.23	1.14	0.36	3.58	0.818	
	Country Economic Status (Ref = Higher)	Lower	1.13	0.51	2.21	3.09	1.14	8.38	0.027	*
Overlap	Intercept	(Intercept)	-2.93	1.69	-1.74	0.05	0.00	1.46	0.082	
	Age	Age	0.03	0.03	1.00	1.03	0.97	1.10	0.315	
	Gender (Ref = Female)	Do not wish to disclose	19.14	3956.18	0.00	205754500.00	0.00	Inf	0.996	
		Male	0.44	0.97	0.46	1.55	0.23	10.32	0.649	
	Ethnicity (Ref = Caucasian)	African American or of African origin (Black)	1.32	1.43	0.92	3.73	0.23	61.26	0.357	
		Asian	-0.08	0.84	-0.09	0.92	0.18	4.76	0.925	
		Do not wish to disclose	-17.20	3956.18	0.00	0.00	0.00	Inf	0.997	

		Hispanic	-0.81	1.20	-0.67	0.45	0.04	4.65	0.500	
		Native American/Indigenous/Pacific Islander	-15.96	3956.18	0.00	0.00	0.00	Inf	0.997	
		Other (please specify)	-16.58	1716.77	-0.01	0.00	0.00	Inf	0.992	
	Country Economic Status (Ref = Higher)	Lower	0.58	0.70	0.84	1.79	0.46	7.05	0.404	
Systemic	Intercept	(Intercept)	-3.09	0.55	-5.57	0.05	0.02	0.13	<0.001	*
	Age	Age	0.02	0.01	2.30	1.02	1.00	1.04	0.021	*
	Gender (Ref = Female)	Do not wish to disclose	0.36	1.17	0.31	1.44	0.15	14.20	0.757	
		Male	0.13	0.30	0.43	1.14	0.63	2.07	0.665	
	Ethnicity (Ref = Caucasian)	African American or of African origin (Black)	1.40	0.76	1.84	4.05	0.92	17.89	0.065	
		Asian	0.92	0.40	2.30	2.50	1.15	5.46	0.021	*
		Do not wish to disclose	0.43	0.60	0.71	1.53	0.47	4.99	0.477	
		Hispanic	0.66	0.49	1.36	1.94	0.75	5.05	0.173	
		Native American/Indigenous/Pacific Islander	-13.39	838.55	-0.02	0.00	0.00	Inf	0.987	
		Other (please specify)	0.91	0.54	1.71	2.50	0.87	7.13	0.087	
	Country Economic Status (Ref = Higher)	Lower	-0.11	0.36	-0.29	0.90	0.44	1.84	0.772	
Single	Intercept	(Intercept)	-1.76	1.17	-1.50	0.17	0.02	1.71	0.133	
	Age	Age	0.01	0.02	0.23	1.01	0.96	1.05	0.819	
	Gender (Ref = Female)	Do not wish to disclose	0.58	7139.08	0.00	1.78	0.00	Inf	1.000	
		Male	0.42	0.62	0.68	1.52	0.46	5.09	0.495	
	Ethnicity (Ref = Caucasian)	African American or of African origin (Black)	-17.63	6522.64	0.00	0.00	0.00	Inf	0.998	

		Asian	-0.47	0.75	-0.62	0.63	0.14	2.74	0.535	
		Do not wish to disclose	-17.57	2902.01	-0.01	0.00	0.00	Inf	0.995	
		Hispanic	-2.04	1.13	-1.80	0.13	0.01	1.20	0.072	
		Native American/Indigenous/Pacific Islander	-17.36	6522.64	0.00	0.00	0.00	Inf	0.998	
		Other (please specify)	-17.39	3260.78	-0.01	0.00	0.00	Inf	0.996	
	Country Economic Status (Ref = Higher)	Lower	0.39	0.70	0.55	1.47	0.37	5.80	0.582	
IMID	Intercept	(Intercept)	-2.80	0.51	-5.45	0.06	0.02	0.17	<0.001	*
	Category (Ref = Single Site)	Overlap	0.45	0.39	1.16	1.57	0.73	3.35	0.246	
		Systemic	0.08	0.29	0.26	1.08	0.61	1.92	0.791	
	Age	Age	0.02	0.01	2.31	1.02	1.00	1.04	0.021	*
	Gender (Ref = Female)	Do not wish to disclose	1.04	0.88	1.18	2.83	0.50	15.91	0.239	
		Male	0.20	0.26	0.80	1.23	0.74	2.02	0.426	
	Ethnicity (Ref = Caucasian)	African American or of African origin (Black)	1.04	0.61	1.70	2.82	0.85	9.33	0.089	
		Asian	0.39	0.31	1.27	1.48	0.81	2.69	0.203	
		Do not wish to disclose	-0.37	0.55	-0.66	0.69	0.23	2.05	0.507	
		Hispanic	-0.14	0.40	-0.36	0.87	0.40	1.89	0.721	
		Native American/Indigenous/Pacific Islander	-13.86	648.86	-0.02	0.00	0.00	Inf	0.983	
		Other (please specify)	0.11	0.49	0.21	1.11	0.42	2.91	0.831	
	Country Economic Status (Ref = Higher)	Lower	0.17	0.28	0.61	1.19	0.68	2.07	0.542	
Whole	Intercept	(Intercept)	-4.02	0.37	-10.99	0.02	0.01	0.04	<0.001	*
	Category (Ref = Control)	Overlap	1.31	0.33	4.01	3.70	1.95	7.01	<0.001	*

	Single	0.79	0.30	2.67	2.21	1.24	3.96	0.008	*
	Systemic	0.89	0.19	4.62	2.43	1.67	3.54	<0.001	*
Age	Age	0.02	0.01	3.58	1.02	1.01	1.04	<0.001	*
Gender (Ref = Female)	Do not wish to disclose	0.76	0.82	0.92	2.13	0.43	10.63	0.357	
	Male	0.48	0.18	2.69	1.61	1.14	2.28	0.007	*
Ethnicity (Ref = Caucasian)	African American or of African origin (Black)	1.05	0.55	1.92	2.85	0.98	8.31	0.055	
	Asian	0.41	0.22	1.86	1.51	0.98	2.34	0.063	
	Do not wish to disclose	-0.18	0.41	-0.44	0.83	0.38	1.85	0.657	
	Hispanic	-0.22	0.28	-0.76	0.81	0.46	1.40	0.445	
	Native American/Indigenous/Pacific Islander	-0.15	1.07	-0.14	0.86	0.11	7.02	0.888	
	Other (please specify)	0.10	0.37	0.26	1.10	0.53	2.29	0.798	
Country Economic Status (Ref = Higher)	Lower	0.39	0.23	1.70	1.48	0.94	2.31	0.089	

Model 1: incorporating age, sex, ethnicity, country economic status and – where relevant – study category*

Multivariate Logistic Regression Analysis of Factors Influencing Likelihood of Hospitalisation for COVID-19: Model 2*

Study Category	Variable Category	Variable	Coefficient	Std Error	z value	OR	Lower CI	Upper CI	p value	sig
Control	Intercept	(Intercept)	-5.33	0.73	-7.27	0.00	0.00	0.02	<0.001	*

	Age	Age	0.03	0.01	2.51	1.03	1.01	1.05	0.012	*
	Gender (Ref = Female)	Do not wish to disclose	-12.69	702.64	-0.02	0.00	0.00	Inf	0.986	
		Male	0.89	0.27	3.29	2.44	1.44	4.16	0.001	*
	Ethnicity (Ref = Caucasian)	African American or of African origin (Black)	1.15	1.31	0.88	3.17	0.24	41.05	0.378	
		Asian	0.37	0.34	1.10	1.45	0.75	2.79	0.272	
		Do not wish to disclose	0.16	0.60	0.26	1.17	0.36	3.77	0.791	
		Hispanic	-0.21	0.41	-0.52	0.81	0.36	1.81	0.603	
		Native American/Indigenous/Pacific Islander	1.14	1.16	0.98	3.12	0.32	30.50	0.329	
		Other (please specify)	0.05	0.59	0.09	1.06	0.33	3.35	0.927	
	Country economic status (Ref = Lower)	Lower	1.05	0.52	2.02	2.85	1.03	7.86	0.043	*
	Health status (Ref = Excellent)	Fair	0.63	0.53	1.18	1.87	0.66	5.27	0.236	
		Good	0.30	0.39	0.77	1.36	0.63	2.94	0.440	
		Poor	1.80	1.35	1.34	6.07	0.43	85.11	0.180	
		Very good	0.04	0.38	0.10	1.04	0.49	2.20	0.919	
	Physical Status (Ref = Completely)	A little	1.10	0.74	1.48	3.01	0.70	12.90	0.139	
		Moderately	0.76	0.43	1.75	2.14	0.91	5.00	0.080	
		Mostly	0.39	0.35	1.10	1.48	0.74	2.97	0.269	
		Not at all	0.04	1.11	0.03	1.04	0.12	9.16	0.974	
Overlap	Intercept	(Intercept)	-3.38	2.10	-1.61	0.03	0.00	2.07	0.107	
	Age	Age	0.00	0.04	-0.06	1.00	0.93	1.07	0.950	
	Gender (Ref = Female)	Do not wish to disclose	18.08	6522.64	0.00	71436700.00	0.00	Inf	0.998	

		Male	-0.29	1.12	-0.26	0.75	0.08	6.75	0.797	
	Ethnicity (Ref = Caucasian)	African American or of African origin (Black)	1.60	1.90	0.84	4.93	0.12	203.37	0.401	
		Asian	-0.34	1.11	-0.31	0.71	0.08	6.29	0.758	
		Do not wish to disclose	-17.46	6522.64	0.00	0.00	0.00	Inf	0.998	
		Hispanic	-0.92	1.34	-0.69	0.40	0.03	5.51	0.493	
		Native American/Indigenous/Pacific Islander	-16.20	6522.64	0.00	0.00	0.00	Inf	0.998	
		Other (please specify)	-18.56	2619.82	-0.01	0.00	0.00	Inf	0.994	
	Country economic status (Ref = Lower)	Lower	0.27	0.91	0.30	1.32	0.22	7.80	0.762	
	Health status (Ref = Very Good)	Fair	0.95	1.32	0.72	2.59	0.19	34.74	0.473	
		Good	0.08	1.36	0.06	1.09	0.08	15.50	0.951	
		Poor	0.27	1.83	0.14	1.30	0.04	47.25	0.885	
	Physical Status (Ref = Completely)	A little	1.20	1.28	0.94	3.33	0.27	41.14	0.348	
		Moderately	-0.04	1.11	-0.04	0.96	0.11	8.39	0.969	
		Mostly	0.28	1.09	0.26	1.32	0.16	11.22	0.797	
		Not at all	22.06	6522.64	0.00	3810257000.00	0.00	Inf	0.997	
	Medications prior to vaccination (Ref = No)	Receiving non-steroidal medications	1.38	1.22	1.13	3.98	0.36	43.63	0.259	
	Steroids (Ref = No)	Receiving steroids	1.12	0.75	1.48	3.06	0.70	13.41	0.139	
Systemic	Intercept	(Intercept)	-3.43	0.84	-4.08	0.03	0.01	0.17	<0.001	*
	Age	Age	0.02	0.01	1.95	1.02	1.00	1.04	0.051	
	Gender (Ref = Female)	Do not wish to disclose	0.73	1.25	0.58	2.07	0.18	23.88	0.561	
		Male	0.30	0.32	0.95	1.35	0.73	2.51	0.340	

	Ethnicity (Ref = Caucasian)	African American or of African origin (Black)	1.17	0.81	1.43	3.21	0.65	15.79	0.152	
		Asian	0.89	0.42	2.12	2.44	1.07	5.54	0.034	*
		Do not wish to disclose	0.45	0.64	0.71	1.57	0.45	5.47	0.477	
		Hispanic	0.88	0.50	1.74	2.41	0.90	6.48	0.081	
		Native American/Indigenous/Pacific Islander	-13.96	1373.77	-0.01	0.00	0.00	Inf	0.992	
		Other (please specify)	1.14	0.56	2.05	3.12	1.05	9.28	0.041	*
	Country economic status (Ref = Lower)	Lower	-0.24	0.39	-0.63	0.79	0.37	1.67	0.530	
	Health status (Ref = Excellent)	Fair	-0.03	0.59	-0.05	0.97	0.30	3.11	0.960	
		Good	0.03	0.58	0.06	1.04	0.33	3.20	0.952	
		Poor	-0.79	0.78	-1.01	0.45	0.10	2.09	0.311	
		Very good	0.08	0.60	0.13	1.08	0.33	3.53	0.893	
		A little	1.29	0.47	2.76	3.65	1.45	9.15	0.006	*
		Moderately	0.56	0.41	1.35	1.75	0.78	3.92	0.177	
	Physical Status (Ref = Completely)	Mostly	0.23	0.37	0.62	1.26	0.61	2.60	0.535	
		Not at all	1.03	0.71	1.44	2.79	0.69	11.27	0.150	
	Medicaitons Prior (Ref = Yes)	Receiving non-steroidal medications	-0.26	0.33	-0.81	0.77	0.41	1.46	0.420	
		NA	-14.86	957.41	-0.02	0.00	0.00	Inf	0.988	
	Steroids (Ref = No)	Receiving steroids	0.78	0.27	2.88	2.18	1.28	3.71	0.004	*
		NA	-0.66	2583.50	0.00	0.52	0.00	Inf	1.000	
Single	Intercept	(Intercept)	-1.64	2.19	-0.75	0.19	0.00	14.30	0.456	
	Age	Age	0.00	0.03	0.14	1.00	0.94	1.08	0.891	

	Gender (Ref = Female)	Do not wish to disclose	20.83	12669.91	0.00	1113335000.00	0.00	Inf	0.999	
		Male	-0.15	0.93	-0.17	0.86	0.14	5.34	0.868	
	Ethnicity (Ref = Caucasian)	African American or of African origin (Black)	-21.03	10754.01	0.00	0.00	0.00	Inf	0.998	
		Asian	-1.15	1.22	-0.95	0.32	0.03	3.44	0.344	
		Do not wish to disclose	-21.71	3614.54	-0.01	0.00	0.00	Inf	0.995	
		Hispanic	-3.48	1.44	-2.42	0.03	0.00	0.52	0.016	*
		Native American/Indigenous/Pacific Islander	-18.36	10754.01	0.00	0.00	0.00	Inf	0.999	
		Other (please specify)	-19.39	4851.19	0.00	0.00	0.00	Inf	0.997	
	Country economic status (Ref = Lower)	Lower	2.15	1.40	1.54	8.62	0.56	133.88	0.124	
	Health status (Ref = Excellent)	Fair	-0.93	1.30	-0.72	0.39	0.03	5.06	0.474	
		Good	-4.17	1.62	-2.57	0.02	0.00	0.37	0.010	*
		Poor	-19.55	5640.30	0.00	0.00	0.00	Inf	0.997	
		Very good	-1.89	1.13	-1.68	0.15	0.02	1.38	0.094	
	Physical Status (Ref = Completely)	A little	2.14	1.81	1.18	8.52	0.24	296.78	0.237	
		Moderately	2.32	1.42	1.64	10.21	0.63	164.83	0.102	
		Mostly	-0.27	1.20	-0.22	0.76	0.07	8.05	0.823	
		Not at all	-16.40	10754.01	0.00	0.00	0.00	Inf	0.999	
	Medicaitons Prior (Ref = Yes)	Receiving non-steroidal medications	1.67	0.93	1.79	5.30	0.86	32.83	0.073	
		NA	-19.01	3885.52	0.00	0.00	0.00	Inf	0.996	
	Steroids (Ref = No)	Receiving steroids	2.86	1.49	1.91	17.38	0.93	324.12	0.056	
IMID	Intercept	(Intercept)	-2.31	0.66	-3.49	0.10	0.03	0.36	0.001	*

Category (Ref = Single Organ)	Overlap	-0.02	0.43	-0.04	0.98	0.43	2.26	0.965	
	Systemic	-0.37	0.33	-1.12	0.69	0.36	1.32	0.264	
Age	Age	0.01	0.01	1.62	1.01	1.00	1.03	0.105	
Gender (Ref = Female)	Do not wish to disclose	1.01	0.96	1.05	2.74	0.42	17.91	0.292	
	Male	0.21	0.27	0.78	1.23	0.73	2.09	0.436	
Ethnicity (Ref = Caucasian)	African American or of African origin (Black)	0.72	0.66	1.08	2.04	0.56	7.49	0.281	
	Asian	0.39	0.33	1.21	1.48	0.78	2.82	0.227	
	Do not wish to disclose	-0.49	0.58	-0.83	0.62	0.20	1.93	0.405	
	Hispanic	-0.03	0.41	-0.07	0.97	0.44	2.16	0.948	
	Native American/Indigenous/Pacific Islander	-14.72	1064.85	-0.01	0.00	0.00	Inf	0.989	
	Other (please specify)	0.28	0.51	0.54	1.32	0.48	3.60	0.591	
Country economic status (Ref = Lower)	Lower	0.07	0.30	0.23	1.07	0.59	1.94	0.820	
Health status (Ref = Excellent)	Fair	-0.40	0.46	-0.87	0.67	0.27	1.65	0.384	
	Good	-0.68	0.44	-1.55	0.51	0.21	1.20	0.122	
	Poor	-1.21	0.63	-1.94	0.30	0.09	1.01	0.052	
	Very good	-0.53	0.46	-1.15	0.59	0.24	1.45	0.248	
Physical Status (Ref = Completely)	A little	1.10	0.39	2.82	2.99	1.40	6.40	0.005	*
	Moderately	0.57	0.34	1.67	1.77	0.91	3.45	0.094	
	Mostly	0.16	0.30	0.53	1.18	0.65	2.14	0.593	
	Not at all	1.09	0.63	1.73	2.99	0.87	10.28	0.083	
Medicaitons Prior (Ref = Yes)	Receiving non-steroidal medications	0.13	0.28	0.46	1.14	0.66	1.96	0.643	

		NA	-14.91	945.72	-0.02	0.00	0.00	Inf	0.987	
	Steroids (Ref = No)	Receiving steroids	0.80	0.23	3.45	2.23	1.41	3.53	0.001	*
		NA	-0.14	1300.41	0.00	0.87	0.00	Inf	1.000	
Whole	Intercept	(Intercept)	9.66	547.46	0.02	15614.41	0.00	Inf	0.986	
	Category (Ref = Control)	Overlap	-13.07	547.45	-0.02	0.00	0.00	Inf	0.981	
		Single	-13.03	547.45	-0.02	0.00	0.00	Inf	0.981	
		Systemic	-13.40	547.45	-0.02	0.00	0.00	Inf	0.981	
	Age	Age	0.02	0.01	2.70	1.02	1.01	1.03	0.007	*
	Gender (Ref = Female)	Do not wish to disclose	0.82	0.86	0.96	2.28	0.42	12.24	0.337	
		Male	0.56	0.18	3.06	1.75	1.22	2.51	0.002	*
	Ethnicity (Ref = Caucasian)	African American or of African origin (Black)	0.78	0.59	1.33	2.19	0.69	6.93	0.184	
		Asian	0.34	0.23	1.46	1.40	0.89	2.20	0.143	
		Do not wish to disclose	-0.36	0.42	-0.85	0.70	0.30	1.60	0.398	
		Hispanic	-0.16	0.29	-0.55	0.85	0.49	1.50	0.584	
		Native American/Indigenous/Pacific Islander	-0.04	1.07	-0.04	0.96	0.12	7.90	0.972	
		Other (please specify)	0.12	0.38	0.30	1.12	0.53	2.37	0.761	
	Country economic status (Ref = Lower)	Lower	0.40	0.24	1.68	1.49	0.93	2.37	0.094	
	Health status (Ref = Excellent)	Fair	0.26	0.33	0.79	1.29	0.68	2.44	0.432	
		Good	-0.01	0.28	-0.03	0.99	0.57	1.73	0.977	
		Poor	-0.38	0.52	-0.72	0.69	0.25	1.90	0.469	
		Very good	-0.10	0.29	-0.36	0.90	0.51	1.58	0.718	

Physical Status (Ref = Completely)	A little	1.08	0.33	3.33	2.96	1.56	5.60	0.001	*
	Moderately	0.65	0.26	2.49	1.93	1.15	3.22	0.013	*
	Mostly	0.27	0.23	1.17	1.31	0.84	2.05	0.240	
	Not at all	0.84	0.52	1.60	2.31	0.83	6.46	0.109	
Medicaitons Prior (Ref = Yes)	Receiving non-steroidal medications	0.13	0.28	0.48	1.14	0.66	1.97	0.630	
	NA	-13.75	575.80	-0.02	0.00	0.00	Inf	0.981	
Steroids (Ref = No)	Receiving steroids	0.76	0.23	3.32	2.15	1.37	3.37	0.001	*
	NA	0.12	794.52	0.00	1.12	0.00	Inf	1.000	

Model 2: incorporating age, sex, ethnicity, country economic status, health status, medication status and – where relevant – study category*

Multivariate Logistic Regression Analysis of Factors Influencing Likelihood of Hospitalisation for COVID-19: Model 3*

Category		Variable	Coefficient	Std Error	z value	OR	Lower CI	Upper CI	p value	sig
Control	Intercept	(Intercept)	-5.33	0.73	-7.27	0.00	0.00	0.02	<0.001	*
	Age	Age	0.03	0.01	2.49	1.03	1.01	1.05	0.013	*
	Gender (Ref = Female)	Do not wish to disclose	-12.70	700.95	-0.02	0.00	0.00	Inf	0.986	
		Male	0.89	0.27	3.28	2.44	1.43	4.15	0.001	*
	Ethnicity (Ref = Caucasian)	African American or of African origin (Black)	1.15	1.30	0.89	3.17	0.25	40.93	0.376	
		Asian	0.36	0.34	1.08	1.44	0.74	2.78	0.282	
		Do not wish to disclose	0.16	0.60	0.26	1.17	0.36	3.76	0.795	
		Hispanic	-0.21	0.41	-0.52	0.81	0.36	1.81	0.606	

		Native American/Indigenous/Pacific Islander	1.13	1.17	0.97	3.09	0.31	30.40	0.334	
		Other (please specify)	0.05	0.59	0.09	1.05	0.33	3.34	0.932	
	Country Economic Status (Ref = Higher)	Lower	1.04	0.52	2.01	2.84	1.03	7.83	0.044	*
	Health status (Ref = Excellent)	Fair	0.61	0.53	1.15	1.85	0.65	5.24	0.249	
		Good	0.30	0.40	0.75	1.35	0.62	2.93	0.455	
		Poor	1.78	1.36	1.31	5.91	0.41	84.61	0.191	
		Very good	0.03	0.38	0.08	1.03	0.49	2.19	0.936	
	Physical status (Ref = Completely)	A little	1.10	0.74	1.48	3.01	0.70	12.92	0.139	
		Moderately	0.76	0.43	1.75	2.14	0.91	5.00	0.080	*
		Mostly	0.39	0.35	1.11	1.48	0.74	2.97	0.268	
		Not at all	0.03	1.11	0.02	1.03	0.12	9.07	0.982	
	Vaccine dose (Ref = 2)	1	0.06	0.28	0.20	1.06	0.61	1.85	0.840	
Overlap	Intercept	(Intercept)	-3.39	2.10	-1.61	0.03	0.00	2.08	0.107	
	Age	Age	0.00	0.04	-0.07	1.00	0.93	1.07	0.948	
	Gender (Ref = Female)	Do not wish to disclose	18.09	6522.64	0.00	71908050.00	0.00	Inf	0.998	
		Male	-0.30	1.14	-0.26	0.74	0.08	6.90	0.794	
		African American or of African origin (Black)	1.61	1.92	0.84	4.99	0.12	216.76	0.403	
		Asian	-0.33	1.13	-0.30	0.72	0.08	6.58	0.768	
		Do not wish to disclose	-17.47	6522.64	0.00	0.00	0.00	Inf	0.998	
		Hispanic	-0.90	1.38	-0.66	0.40	0.03	6.01	0.511	

		Native American/Indigenous/Pacific Islander	-16.19	6522.64	0.00	0.00	0.00	Inf	0.998	
		Other (please specify)	-18.59	2632.22	-0.01	0.00	0.00	Inf	0.994	
	Country Economic Status (Ref = Higher)	Lower	0.27	0.91	0.30	1.31	0.22	7.81	0.764	
	Health status (Ref = Very Good)	Fair	0.95	1.33	0.72	2.58	0.19	34.72	0.475	
		Good	0.07	1.37	0.05	1.08	0.07	15.91	0.957	
		Poor	0.26	1.84	0.14	1.29	0.03	47.94	0.889	
	Physical status (Ref = Completely)	A little	1.21	1.29	0.94	3.35	0.27	41.76	0.348	
		Moderately	-0.05	1.12	-0.04	0.95	0.11	8.48	0.966	
		Mostly	0.28	1.10	0.25	1.32	0.15	11.28	0.801	
		Not at all	22.07	6522.64	0.00	3851542000.00	0.00	Inf	0.997	
	Non-steroidal medications (Ref = No)	Receiving non-steroidal medications	1.39	1.23	1.13	3.99	0.36	44.26	0.259	
	Steroids (Ref = No)	Receiving steroids	1.12	0.75	1.48	3.06	0.70	13.41	0.139	
	Vaccine dose (Ref = 2)	1	0.03	0.84	0.04	1.04	0.20	5.41	0.968	
Systemic	Intercept	(Intercept)	-3.43	0.84	-4.07	0.03	0.01	0.17	<0.001	*
	Age	Age	0.02	0.01	1.95	1.02	1.00	1.04	0.052	
	Gender (Ref = Female)	Do not wish to disclose	0.73	1.25	0.58	2.07	0.18	23.98	0.560	
		Male	0.30	0.32	0.95	1.35	0.73	2.51	0.341	
	Ethnicity (Ref = Caucasian)	African American or of African origin (Black)	1.17	0.81	1.43	3.21	0.65	15.83	0.151	
		Asian	0.89	0.42	2.12	2.43	1.07	5.53	0.034	*

		Do not wish to disclose	0.45	0.64	0.70	1.57	0.45	5.46	0.482	
		Hispanic	0.88	0.51	1.73	2.40	0.89	6.46	0.083	
		Native American/Indigenous/Pacific Islander	-13.95	1374.29	-0.01	0.00	0.00	Inf	0.992	
		Other (please specify)	1.13	0.56	2.04	3.11	1.04	9.26	0.042	*
	Country Economic Status (Ref = Higher)	Lower	-0.23	0.39	-0.59	0.79	0.37	1.71	0.554	
	Health status (Ref = Excellent)	Fair	-0.02	0.60	-0.04	0.98	0.30	3.14	0.968	
		Good	0.04	0.58	0.07	1.04	0.34	3.24	0.943	
		Poor	-0.78	0.79	-0.99	0.46	0.10	2.14	0.321	
		Very good	0.09	0.60	0.14	1.09	0.33	3.57	0.885	
	Physical status (Ref = Completely)	A little	1.30	0.47	2.76	3.66	1.46	9.18	0.006	*
		Moderately	0.56	0.42	1.36	1.76	0.78	3.97	0.175	
		Mostly	0.23	0.37	0.62	1.26	0.61	2.60	0.536	
		Not at all	1.02	0.71	1.43	2.77	0.68	11.23	0.154	
	Non-steroidal medications (Ref = No)	Receiving non-steroidal medications	-0.26	0.33	-0.81	0.77	0.41	1.46	0.420	
		NA	-14.85	957.57	-0.02	0.00	0.00	Inf	0.988	
	Steroids (Ref = No)	Receiving steroids	0.78	0.27	2.88	2.19	1.28	3.72	0.004	*
		NA	-0.68	2583.56	0.00	0.51	0.00	Inf	1.000	
	Vaccine dose (Ref = 2)	1	-0.04	0.27	-0.13	0.96	0.57	1.64	0.893	
Single	Intercept	(Intercept)	-1.15	2.29	-0.50	0.32	0.00	27.88	0.614	
	Age	Age	0.00	0.04	-0.11	1.00	0.93	1.07	0.913	

Gender (Ref = Female)	Do not wish to disclose	23.01	12496.77	0.00	9854033000.00	0.00	Inf	0.999	
	Male	-0.57	1.01	-0.57	0.56	0.08	4.06	0.570	
	African American or of African origin (Black)	-20.35	10754.01	0.00	0.00	0.00	Inf	0.999	
	Asian	-1.08	1.29	-0.84	0.34	0.03	4.21	0.400	
	Do not wish to disclose	-22.47	3522.14	-0.01	0.00	0.00	Inf	0.995	
	Hispanic	-3.37	1.49	-2.26	0.03	0.00	0.64	0.024	*
	Native American/Indigenous/Pacific Islander	-17.74	10754.01	0.00	0.00	0.00	Inf	0.999	
	Other (please specify)	-18.55	4955.89	0.00	0.00	0.00	Inf	0.997	
Country Economic Status (Ref = Higher)	Lower	1.73	1.40	1.24	5.65	0.36	87.79	0.216	
Health status (Ref = Excellent)	Fair	-1.29	1.47	-0.88	0.28	0.02	4.90	0.380	
	Good	-4.28	1.61	-2.65	0.01	0.00	0.33	0.008	*
	Poor	-20.85	5302.36	0.00	0.00	0.00	Inf	0.997	
	Very good	-2.27	1.26	-1.81	0.10	0.01	1.21	0.071	
Physical status (Ref = Completely)	A little	2.66	1.95	1.36	14.26	0.31	650.74	0.173	
	Moderately	2.04	1.46	1.40	7.68	0.44	133.33	0.162	
	Mostly	-0.27	1.28	-0.21	0.76	0.06	9.44	0.834	
	Not at all	-15.85	10754.01	0.00	0.00	0.00	Inf	0.999	
Non-steroidal medications (Ref = No)	Receiving non-steroidal medications	1.45	0.97	1.50	4.28	0.64	28.70	0.135	
	NA	-18.76	3899.48	0.00	0.00	0.00	Inf	0.996	

	Steroids (Ref = No)	Receiving steroids	3.05	1.50	2.03	21.08	1.11	399.06	0.042	*
	Vaccine dose (Ref = 2)	1	1.32	0.86	1.54	3.75	0.70	20.05	0.122	
IMID	Intercept	(Intercept)	-2.32	0.66	-3.50	0.10	0.03	0.36	0.001	*
	Category (Ref = Single Organ)	Overlap	-0.01	0.43	-0.03	0.99	0.43	2.28	0.973	
		Systemic	-0.37	0.33	-1.12	0.69	0.36	1.32	0.264	
	Age	Age	0.01	0.01	1.62	1.01	1.00	1.03	0.105	
	Gender (Ref = Female)	Do not wish to disclose	1.01	0.96	1.06	2.75	0.42	17.94	0.291	
		Male	0.21	0.27	0.77	1.23	0.73	2.08	0.439	
	Ethnicity (Ref = Caucasian)	African American or of African origin (Black)	0.72	0.66	1.08	2.05	0.56	7.51	0.278	
		Asian	0.40	0.33	1.21	1.49	0.78	2.82	0.226	
		Do not wish to disclose	-0.49	0.58	-0.83	0.61	0.20	1.93	0.404	
		Hispanic	-0.02	0.41	-0.05	0.98	0.44	2.18	0.957	
		Native American/Indigenous/Pacific Islander	-14.72	1064.88	-0.01	0.00	0.00	Inf	0.989	
		Other (please specify)	0.28	0.51	0.55	1.32	0.48	3.62	0.586	
	Country Economic Status (Ref = Higher)	Lower	0.06	0.31	0.20	1.06	0.58	1.94	0.839	
	Health status (Ref = Excellent)	Fair	-0.41	0.46	-0.88	0.67	0.27	1.64	0.379	
		Good	-0.69	0.44	-1.55	0.50	0.21	1.20	0.120	
		Poor	-1.22	0.63	-1.95	0.29	0.09	1.01	0.052	
		Very good	-0.54	0.46	-1.16	0.58	0.24	1.45	0.245	

	Physical status (Ref = Completely)	A little	1.09	0.39	2.82	2.99	1.40	6.39	0.005	*
		Moderately	0.56	0.34	1.64	1.76	0.90	3.45	0.100	
		Mostly	0.16	0.30	0.53	1.17	0.65	2.13	0.597	
		Not at all	1.10	0.63	1.74	3.00	0.87	10.36	0.082	
	Non-steroidal medications (Ref = No)	Receiving non-steroidal medications	0.13	0.28	0.47	1.14	0.66	1.96	0.641	
		NA	-14.92	945.49	-0.02	0.00	0.00	Inf	0.987	
	Steroids (Ref = No)	Receiving steroids	0.80	0.23	3.42	2.23	1.41	3.52	0.001	*
		NA	-0.13	1300.12	0.00	0.88	0.00	Inf	1.000	
	Vaccine dose (Ref = 2)	1	0.03	0.23	0.15	1.03	0.66	1.61	0.881	
Whole	Intercept	(Intercept)	9.67	547.47	0.02	15887.61	0.00	Inf	0.986	
	Category (Ref = Control)	Overlap	-13.07	547.47	-0.02	0.00	0.00	Inf	0.981	
		Single	-13.03	547.47	-0.02	0.00	0.00	Inf	0.981	
		Systemic	-13.40	547.47	-0.02	0.00	0.00	Inf	0.981	
	Age	Age	0.02	0.01	2.70	1.02	1.01	1.03	0.007	*
	Gender (Ref = Female)	Do not wish to disclose	0.83	0.86	0.96	2.28	0.43	12.24	0.336	
		Male	0.56	0.18	3.05	1.75	1.22	2.51	0.002	*
	Ethnicity (Ref = Caucasian)	African American or of African origin (Black)	0.78	0.59	1.33	2.19	0.69	6.94	0.183	
		Asian	0.34	0.23	1.46	1.40	0.89	2.20	0.144	
		Do not wish to disclose	-0.36	0.42	-0.85	0.70	0.30	1.60	0.397	
		Hispanic	-0.16	0.29	-0.54	0.86	0.49	1.50	0.588	

	Native American/Indigenous/Pacific Islander	-0.04	1.07	-0.04	0.96	0.12	7.88	0.970	
	Other (please specify)	0.12	0.38	0.31	1.12	0.53	2.37	0.759	
Country Economic Status (Ref = Higher)	Lower	0.40	0.24	1.65	1.49	0.93	2.37	0.098	
Health status (Ref = Excellent)	Fair	0.25	0.33	0.77	1.29	0.68	2.44	0.440	
	Good	-0.01	0.29	-0.04	0.99	0.56	1.73	0.969	
	Poor	-0.38	0.52	-0.73	0.68	0.25	1.90	0.465	
	Very good	-0.11	0.29	-0.37	0.90	0.51	1.58	0.711	
Physical status (Ref = Completely)	A little	1.08	0.33	3.33	2.96	1.56	5.60	0.001	*
	Moderately	0.65	0.26	2.48	1.92	1.15	3.22	0.013	*
	Mostly	0.27	0.23	1.17	1.31	0.84	2.05	0.241	
	Not at all	0.84	0.52	1.60	2.32	0.83	6.47	0.109	
Non-steroidal medications (Ref = No)	Receiving non-steroidal medications	0.13	0.28	0.48	1.14	0.66	1.97	0.629	
	NA	-13.76	575.72	-0.02	0.00	0.00	Inf	0.981	
Steroids (Ref = No)	Receiving steroids	0.76	0.23	3.30	2.14	1.36	3.37	0.001	
	NA	0.13	794.46	0.00	1.14	0.00	Inf	1.000	
Vaccine dose (Ref = 2)	doses2	-0.02	0.18	-0.12	0.98	0.69	1.38	0.906	

Model 3: incorporating age, sex, ethnicity, country economic status, health status, medication status, vaccine dose and – where relevant – study category*

Appendix 21: Cohort prior to Follow-up

Table 1 of Cohort Prior to Follow-Up, Aggregated

	Immunocompetent	Immunosuppressed	HIV	*p-value*	SMD
n	9125532	1838835	11194		
Age (mean (SD))	42.94 (17.92)	59.86 (18.02)	44.34 (11.38)	<0.001	0.688
Ethnicity (%)				<0.001	0.614
A	1100373 (13.2)	173964 (9.9)	494 (4.6)		
B	417301 (5.0)	69933 (4.0)	3296 (30.7)		
M	167435 (2.0)	18946 (1.1)	530 (4.9)		
O	239685 (2.9)	22182 (1.3)	346 (3.2)		
W	6397951 (76.9)	1474731 (83.8)	6054 (56.5)		
Sex = M (%)	4543377 (49.8)	923233 (50.2)	7913 (70.7)	<0.001	0.291
UrbanRural = Urban (%)	8068529 (89.2)	1580183 (86.7)	10640 (95.8)	<0.001	0.219
IMDQuintile (%)				<0.001	0.367
1	1745231 (19.1)	346890 (18.9)	3618 (32.3)		
2	1985407 (21.8)	365836 (19.9)	3394 (30.3)		
3	1834541 (20.1)	367410 (20.0)	1971 (17.6)		
4	1780194 (19.5)	377658 (20.5)	1332 (11.9)		
5	1779534 (19.5)	380936 (20.7)	879 (7.9)		
NHSRegion (%)				<0.001	0.385
East of England	366623 (4.0)	78187 (4.3)	245 (2.2)		
London	2199643 (24.1)	335058 (18.2)	4798 (42.9)		
Midlands	1531469 (16.8)	341200 (18.6)	1286 (11.5)		
North East and Yorkshire	546412 (6.0)	133908 (7.3)	369 (3.3)		
North West	1601558 (17.6)	348337 (18.9)	1849 (16.5)		
South East	2086123 (22.9)	428830 (23.3)	1943 (17.4)		
South West	793704 (8.7)	173315 (9.4)	704 (6.3)		

BMI (mean (SD))	26.52 (6.10)	28.28 (6.52)	26.88 (6.06)	<0.001	0.188
SmokingStatus (%)				<0.001	0.284
ActiveSmoker	1589827 (18.6)	263383 (14.4)	3016 (27.5)		
Ex-smoker	1640356 (19.2)	552559 (30.2)	2062 (18.8)		
Non-Smoker	5303517 (62.1)	1013793 (55.4)	5904 (53.8)		
COVID Vaccinated over Follow Up Period = Yes (%)	6646252 (72.8)	1596950 (86.8)	8677 (77.5)	<0.001	0.236
N dose (%)				<0.001	0.52
0	2479280 (27.2)	241885 (13.2)	2517 (22.5)		
1	314633 (3.4)	40723 (2.2)	371 (3.3)		
2	1306823 (14.3)	176766 (9.6)	1491 (13.3)		
3	2634791 (28.9)	365677 (19.9)	2341 (20.9)		
4	1003371 (11.0)	250214 (13.6)	1281 (11.4)		
5	869097 (9.5)	370692 (20.2)	1102 (9.8)		
6	164310 (1.8)	128361 (7.0)	1072 (9.6)		
7	342408 (3.8)	243303 (13.2)	875 (7.8)		
8	10515 (0.1)	20812 (1.1)	136 (1.2)		
9	304 (0.0)	402 (0.0)	8 (0.1)		

Table 1 of Cohort Prior to Follow-Up, Disaggregated

	1	2	3	4	5	6	7	8	9	10	*p-value*	SMD
n	8099	29935	69968	344324	30016	527185	20721	312643	1506	494438		
Age (mean (SD))	52.69 (14.91)	64.75 (17.55)	52.50 (18.64)	69.21 (14.07)	70.67 (18.43)	59.54 (17.29)	59.54 (19.24)	47.35 (17.47)	49.36 (20.12)	61.86 (16.36)	<0.001	0.56
Ethnicity (%)											<0.001	0.292
A	965 (12.6)	1410 (5.0)	10762 (16.0)	10733 (3.3)	2808 (9.9)	32548 (6.5)	1576 (7.9)	30313 (10.2)	88 (6.2)	82761 (17.2)		
B	492 (6.4)	647 (2.3)	8404 (12.5)	7248 (2.2)	1688 (6.0)	11270 (2.2)	1687 (8.5)	7588 (2.6)	40 (2.8)	30869 (6.4)		
M	111 (1.4)	219 (0.8)	1300 (1.9)	1951 (0.6)	294 (1.0)	4456 (0.9)	271 (1.4)	4308 (1.5)	20 (1.4)	6016 (1.3)		
O	126 (1.6)	307 (1.1)	1140 (1.7)	2492 (0.8)	292 (1.0)	4912 (1.0)	291 (1.5)	5000 (1.7)	20 (1.4)	7602 (1.6)		
W	5993 (78.0)	25781 (90.9)	45462 (67.8)	304029 (93.1)	23173 (82.0)	451078 (89.5)	16089 (80.8)	249287 (84.1)	1262 (88.3)	352577 (73.5)		
Sex = M (%)	4775 (59.0)	16580 (55.4)	27877 (39.8)	167458 (48.6)	14439 (48.1)	283053 (53.7)	7569 (36.5)	147274 (47.1)	657 (43.6)	253551 (51.3)	<0.001	0.168
UrbanRural = Urban (%)	7045 (87.6)	25121 (84.6)	62195 (89.7)	286639 (83.9)	26171 (88.0)	442808 (84.8)	17868 (86.9)	273662 (88.4)	1270 (84.8)	437404 (89.4)	<0.001	0.075
IMDQuintile (%)											<0.001	0.149
1	1564 (19.3)	4468 (14.9)	16114 (23.0)	48087 (14.0)	6531 (21.8)	86828 (16.5)	4535 (21.9)	62437 (20.0)	300 (19.9)	116026 (23.5)		
2	1687 (20.8)	5249 (17.5)	15384 (22.0)	58300 (16.9)	6472 (21.6)	97877 (18.6)	4401 (21.2)	64118 (20.5)	329 (21.8)	112019 (22.7)		
3	1605 (19.8)	6104 (20.4)	13471 (19.3)	69612 (20.2)	5998 (20.0)	106722 (20.2)	4066 (19.6)	61830 (19.8)	286 (19.0)	97716 (19.8)		
4	1641 (20.3)	6819 (22.8)	12767 (18.2)	79842 (23.2)	5800 (19.3)	115246 (21.9)	3924 (18.9)	62308 (19.9)	265 (17.6)	89046 (18.0)		

5	1601 (19.8)	7294 (24.4)	12228 (17.5)	88473 (25.7)	5214 (17.4)	120472 (22.9)	3795 (18.3)	61930 (19.8)	326 (21.6)	79603 (16.1)		
NHSRegion (%)											<0.001	0.166
East of England	354 (4.4)	1405 (4.7)	2291 (3.3)	15972 (4.6)	1042 (3.5)	24470 (4.6)	633 (3.1)	13845 (4.4)	92 (6.1)	18083 (3.7)		
London	1728 (21.3)	4743 (15.8)	17322 (24.8)	47595 (13.8)	5630 (18.8)	77202 (14.6)	4092 (19.7)	62542 (20.0)	222 (14.7)	113982 (23.1)		
Midlands	1320 (16.3)	5583 (18.7)	12264 (17.5)	62320 (18.1)	6025 (20.1)	103121 (19.6)	3846 (18.6)	53012 (17.0)	254 (16.9)	93455 (18.9)		
North East and Yorkshire	543 (6.7)	2061 (6.9)	4309 (6.2)	24706 (7.2)	2350 (7.8)	41474 (7.9)	1800 (8.7)	22682 (7.3)	131 (8.7)	33852 (6.8)		
North West	1415 (17.5)	5369 (17.9)	13085 (18.7)	66628 (19.4)	5716 (19.0)	98886 (18.8)	4308 (20.8)	61416 (19.6)	240 (15.9)	91274 (18.5)		
South East	1937 (23.9)	7467 (24.9)	14789 (21.1)	89774 (26.1)	6231 (20.8)	129417 (24.5)	4208 (20.3)	71310 (22.8)	387 (25.7)	103310 (20.9)		
South West	802 (9.9)	3307 (11.0)	5908 (8.4)	37329 (10.8)	3022 (10.1)	52615 (10.0)	1834 (8.9)	27836 (8.9)	180 (12.0)	40482 (8.2)		
BMI (mean (SD))	26.97 (5.81)	26.98 (5.84)	26.41 (6.20)	27.14 (5.85)	28.00 (6.77)	28.47 (6.51)	27.28 (6.56)	27.66 (6.44)	27.52 (6.90)	29.66 (6.81)	<0.001	0.161
SmokingStatus (%)											<0.001	0.176
ActiveSmoker	913 (11.3)	3204 (10.8)	9452 (13.6)	36445 (10.6)	2712 (9.1)	69804 (13.3)	3064 (14.9)	67122 (21.7)	276 (18.8)	70391 (14.3)		
Ex-smoker	2106 (26.1)	9505 (32.0)	15536 (22.4)	118022 (34.4)	9961 (33.3)	163401 (31.1)	5353 (26.0)	80830 (26.1)	343 (23.4)	147502 (29.9)		
Non-Smoker	5037 (62.5)	17015 (57.2)	44334 (64.0)	188573 (55.0)	17209 (57.6)	291638 (55.6)	12192 (59.2)	161408 (52.2)	848 (57.8)	275539 (55.8)		
COVID Vaccinated over Follow Up Period = Yes (%)	7129 (88.0)	25730 (86.0)	57548 (82.2)	298444 (86.7)	23743 (79.1)	470739 (89.3)	17776 (85.8)	262917 (84.1)	1329 (88.2)	431595 (87.3)	<0.001	0.099
N dose (%)											<0.001	0.468

0	970 (12.0)	4205 (14.0)	12420 (17.8)	45880 (13.3)	6273 (20.9)	56446 (10.7)	2945 (14.2)	49726 (15.9)	177 (11.8)	62843 (12.7)	
1	181 (2.2)	610 (2.0)	1856 (2.7)	7008 (2.0)	1004 (3.3)	9939 (1.9)	527 (2.5)	8420 (2.7)	44 (2.9)	11134 (2.3)	
2	732 (9.0)	2235 (7.5)	9175 (13.1)	23863 (6.9)	3192 (10.6)	43988 (8.3)	2157 (10.4)	42725 (13.7)	187 (12.4)	48512 (9.8)	
3	1110 (13.7)	3531 (11.8)	16045 (22.9)	46071 (13.4)	4434 (14.8)	103996 (19.7)	4080 (19.7)	91110 (29.1)	384 (25.5)	94916 (19.2)	
4	842 (10.4)	2633 (8.8)	8881 (12.7)	43550 (12.6)	3333 (11.1)	78652 (14.9)	2778 (13.4)	43127 (13.8)	227 (15.1)	66191 (13.4)	
5	808 (10.0)	2900 (9.7)	10314 (14.7)	70446 (20.5)	4260 (14.2)	106109 (20.1)	3909 (18.9)	49335 (15.8)	293 (19.5)	122318 (24.7)	
6	900 (11.1)	3548 (11.9)	4222 (6.0)	31866 (9.3)	2553 (8.5)	42805 (8.1)	1509 (7.3)	10630 (3.4)	73 (4.8)	30255 (6.1)	
7	1431 (17.7)	6909 (23.1)	6049 (8.6)	71894 (20.9)	4451 (14.8)	76691 (14.5)	2680 (12.9)	16533 (5.3)	121 (8.0)	56544 (11.4)	
8	1100 (13.6)	3283 (11.0)	984 (1.4)	3677 (1.1)	512 (1.7)	8420 (1.6)	134 (0.6)	1016 (0.3)	0 (0.0)	1686 (0.3)	
9	25 (0.3)	81 (0.3)	22 (0.0)	69 (0.0)	4 (0.0)	139 (0.0)	2 (0.0)	21 (0.0)	0 (0.0)	39 (0.0)	

Appendix 22: Cohort after Age-Sex Matching

Table 1 of Age Sex Matched Cohort, Disaggregated IS + IRG

	1	2	3	4	5	6	7	8	9	10	11
n	9280	39496	89779	477311	38938	645448	24705	382477	2159	635437	14175
Age (mean (SD))	51.94 (14.93)	63.47 (17.52)	51.12 (18.55)	67.40 (14.29)	69.53 (18.82)	57.68 (17.56)	57.96 (19.30)	46.33 (17.37)	49.46 (19.67)	60.08 (16.14)	43.36 (11.65)
Ethnicity (%)											
A	1094 (12.4)	1913 (5.1)	13590 (15.8)	15697 (3.5)	3696 (10.0)	42635 (6.9)	1865 (7.8)	39373 (10.8)	115 (5.6)	111095 (18.0)	721 (5.3)
B	565 (6.4)	878 (2.3)	11366 (13.2)	10485 (2.3)	2208 (6.0)	14286 (2.3)	2190 (9.2)	9808 (2.7)	52 (2.5)	41527 (6.7)	4315 (31.9)
M	133 (1.5)	293 (0.8)	1805 (2.1)	2904 (0.6)	403 (1.1)	5891 (1.0)	347 (1.5)	5655 (1.6)	33 (1.6)	8238 (1.3)	723 (5.3)
O	161 (1.8)	450 (1.2)	1680 (2.0)	3793 (0.8)	424 (1.2)	6958 (1.1)	363 (1.5)	6873 (1.9)	32 (1.5)	10819 (1.8)	471 (3.5)
W	6859 (77.8)	33910 (90.6)	57580 (66.9)	420119 (92.7)	30070 (81.7)	547875 (88.7)	19009 (80.0)	301188 (83.0)	1834 (88.8)	445504 (72.2)	7293 (53.9)
Sex = M (%)	3815 (41.1)	21471 (54.4)	35631 (39.7)	225976 (47.3)	18138 (46.6)	344382 (53.4)	8866 (35.9)	177731 (46.5)	917 (42.5)	326108 (51.3)	9849 (69.5)
UrbanRural = Urban (%)	8041 (87.3)	33143 (84.5)	79901 (89.9)	397842 (84.0)	34001 (88.2)	542927 (84.9)	21384 (87.2)	335035 (88.4)	1841 (85.7)	562765 (89.5)	13464 (95.8)
IMDQuintile (%)											
1	1805 (19.5)	5872 (14.9)	20656 (23.0)	68718 (14.4)	8636 (22.2)	107446 (16.6)	5405 (21.9)	76633 (20.0)	408 (18.9)	151956 (23.9)	4533 (32.0)
2	1928 (20.8)	6886 (17.4)	19959 (22.2)	81695 (17.1)	8368 (21.5)	120509 (18.7)	5259 (21.3)	79273 (20.7)	466 (21.6)	144976 (22.8)	4252 (30.0)

3	1836 (19.8)	8095 (20.5)	17244 (19.2)	96277 (20.2)	7759 (19.9)	130448 (20.2)	4822 (19.5)	75576 (19.8)	419 (19.4)	125128 (19.7)	2481 (17.5)
4	1869 (20.1)	8987 (22.8)	16288 (18.1)	109423 (22.9)	7398 (19.0)	140357 (21.7)	4699 (19.0)	75747 (19.8)	408 (18.9)	112667 (17.7)	1721 (12.1)
5	1841 (19.8)	9655 (24.4)	15625 (17.4)	121184 (25.4)	6775 (17.4)	146641 (22.7)	4520 (18.3)	75224 (19.7)	458 (21.2)	100664 (15.8)	1188 (8.4)
NHSRegion (%)											
East of England	403 (4.3)	1841 (4.7)	2898 (3.2)	22066 (4.6)	1406 (3.6)	29798 (4.6)	767 (3.1)	16719 (4.4)	123 (5.7)	23137 (3.6)	322 (2.3)
London	1987 (21.4)	6291 (15.9)	22503 (25.1)	67223 (14.1)	7337 (18.8)	96811 (15.0)	4920 (19.9)	78346 (20.5)	317 (14.7)	147783 (23.3)	5933 (41.9)
Midlands	1525 (16.4)	7328 (18.6)	15490 (17.3)	86681 (18.2)	7595 (19.5)	124151 (19.2)	4526 (18.3)	64178 (16.8)	393 (18.2)	119107 (18.7)	1686 (11.9)
North East and Yorkshire	638 (6.9)	2720 (6.9)	5509 (6.1)	34789 (7.3)	3029 (7.8)	50371 (7.8)	2156 (8.7)	27331 (7.1)	176 (8.2)	43917 (6.9)	491 (3.5)
North West	1605 (17.3)	7110 (18.0)	17057 (19.0)	91562 (19.2)	7827 (20.1)	121550 (18.8)	5102 (20.7)	74657 (19.5)	352 (16.3)	115465 (18.2)	2332 (16.5)
South East	2220 (23.9)	9864 (25.0)	18962 (21.1)	124269 (26.0)	8010 (20.6)	158488 (24.6)	5013 (20.3)	87451 (22.9)	543 (25.2)	133990 (21.1)	2523 (17.8)
South West	902 (9.7)	4342 (11.0)	7360 (8.2)	50721 (10.6)	3734 (9.6)	64279 (10.0)	2221 (9.0)	33795 (8.8)	255 (11.8)	52038 (8.2)	888 (6.3)
BMI (mean (SD))	26.93 (5.78)	26.93 (5.82)	26.30 (6.19)	27.08 (5.87)	27.90 (6.78)	28.48 (6.53)	27.29 (6.58)	27.62 (6.48)	27.63 (6.95)	30.22 (7.08)	26.84 (6.11)
Smoking Status (%)											
Active Smoker	1067 (11.6)	4436 (11.3)	12385 (14.0)	57494 (12.1)	3893 (10.1)	88949 (13.9)	3661 (15.0)	82099 (21.8)	391 (18.6)	95536 (15.1)	3681 (26.9)
Ex-smoker	2419 (26.3)	12184 (31.1)	19364 (21.9)	158534 (33.4)	12439 (32.2)	193570 (30.2)	6184 (25.3)	95683 (25.4)	476 (22.6)	183178 (28.9)	2477 (18.1)

Non-Smoker		5722 (62.1)	22510 (57.5)	56778 (64.1)	258526 (54.5)	22341 (57.8)	358593 (55.9)	14642 (59.8)	199462 (52.9)	1240 (58.9)	354839 (56.0)	7550 (55.1)
COVID Vaccinated over Follow Up Period = Yes (%)		8185 (88.2)	34519 (87.4)	74033 (82.5)	419999 (88.0)	31826 (81.7)	577867 (89.5)	21233 (85.9)	322142 (84.2)	1936 (89.7)	556893 (87.6)	10760 (75.9)
N dose (%)												
	0	1095 (11.8)	4977 (12.6)	15746 (17.5)	57312 (12.0)	7112 (18.3)	67581 (10.5)	3472 (14.1)	60335 (15.8)	223 (10.3)	78544 (12.4)	3415 (24.1)
	1	220 (2.4)	828 (2.1)	2636 (2.9)	10181 (2.1)	1260 (3.2)	12925 (2.0)	656 (2.7)	10857 (2.8)	63 (2.9)	15499 (2.4)	632 (4.5)
	2	863 (9.3)	2981 (7.5)	12308 (13.7)	35142 (7.4)	4031 (10.4)	57780 (9.0)	2625 (10.6)	54116 (14.1)	261 (12.1)	64825 (10.2)	1923 (13.6)
	3	1311 (14.1)	4953 (12.5)	21192 (23.6)	70130 (14.7)	5884 (15.1)	137287 (21.3)	4993 (20.2)	114817 (30.0)	568 (26.3)	127535 (20.1)	2909 (20.5)
	4	996 (10.7)	3792 (9.6)	11422 (12.7)	65290 (13.7)	4506 (11.6)	98090 (15.2)	3341 (13.5)	52385 (13.7)	337 15.6)	88224 (13.9)	1556 (11.0)
	5	948 (10.2)	4273 (10.8)	12905 (14.4)	99751 (20.9)	5914 (15.2)	128077 (19.8)	4666 (18.9)	58022 (15.2)	417 (19.3)	159713 (25.1)	1309 (9.2)
	6	1059 (11.4)	4875 (12.3)	5204 (5.8)	45547 (9.5)	3497 (9.0)	49165 (7.6)	1764 (7.1)	12194 (3.2)	105 (4.9)	35089 (5.5)	1266 (8.9)
	7	1547 (16.7)	8620 (21.8)	7145 (8.0)	88848 (18.6)	6139 (15.8)	85179 (13.2)	3030 (12.3)	18602 (4.9)	185 (8.6)	64045 (10.1)	1001 (7.1)
	8	1192 (12.8)	4074 (10.3)	1181 (1.3)	5016 (1.1)	589 (1.5)	9220 (1.4)	156 (0.6)	1125 (0.3)	0 (0.0)	1915 (0.3)	155 (1.1)
	9	49 (0.5)	123 (0.3)	40 (0.0)	94 (0.0)	6 (0.0)	144 (0.0)	2 (0.0)	24 (0.0)	0 (0.0)	48 (0.0)	9 (0.1)

Appendix 23: Primary Analysis – Age-Sex Matched & Fully Adjusted IRRs of Outcomes of Interest by IS + IRG subgroup

Checking adherence of outcome data to Poisson assumption of mean and variance equality

Outcome	Final Assignment	Mean	Variance	Difference	Median difference per outcome
COVID infection (event history)	0	0.205213034	0.16310066	0.0421	0.0431436
	1	0.353895755	0.22867813	0.1252	
	2	0.23494944	0.17975264	0.0552	
	3	0.211812853	0.16695001	0.0449	
	4	0.160592543	0.13480285	0.0258	
	5	0.201377835	0.1608288	0.0405	
	6	0.218733165	0.17088923	0.0478	
	7	0.210193884	0.16601905	0.0442	
	8	0.235326451	0.17994838	0.0554	
	9	0.204880295	0.1629794	0.0419	
	10	0.170486946	0.14142137	0.0291	
	11	0.195557123	0.15732563	0.0382	
COVID infection (total count)	0	0.224360143	0.21543226	0.0089	0.0008715
	1	0.419774315	0.39556766	0.0242	
	2	0.264494276	0.26426446	0.0002	
	3	0.236400841	0.23509169	0.0013	
	4	0.174213449	0.17334384	0.0009	
	5	0.23370971	0.25291193	-0.0192	
	6	0.242052439	0.23516465	0.0069	
	7	0.233859684	0.23298636	0.0009	

	8	0.260347877	0.24721607	0.0131	
	9	0.232044199	0.24000448	-0.0080	
	10	0.186263456	0.18619444	0.0001	
	11	0.220733427	0.22773851	-0.0070	
Multiple COVID-19 cases	0	0.017765658	0.01745004	0.0003	0.0005090
	1	0.056958624	0.05372011	0.0032	
	2	0.025490148	0.02484101	0.0006	
	3	0.022309479	0.02181201	0.0005	
	4	0.01258522	0.01242686	0.0002	
	5	0.028228213	0.02743206	0.0008	
	6	0.021124627	0.02067841	0.0004	
	7	0.021107336	0.02066264	0.0004	
	8	0.022947813	0.02242127	0.0005	
	9	0.023480663	0.02293988	0.0005	
	10	0.01447979	0.01427015	0.0002	
	11	0.022849083	0.02232858	0.0005	
Breakthrough infection 1 (event history)	0	0.06559406	0.06129149	0.0043	0.0045644
	1	0.168189146	0.13991659	0.0283	
	2	0.100551339	0.090443	0.0101	
	3	0.068565424	0.06386491	0.0047	
	4	0.053213482	0.05038191	0.0028	
	5	0.062524871	0.05861697	0.0039	
	6	0.075620439	0.0699021	0.0057	
	7	0.06739956	0.06285937	0.0045	
	8	0.076082851	0.07029443	0.0058	
	9	0.066758748	0.06233071	0.0044	
	10	0.050937055	0.04834255	0.0026	
	11	0.067771509	0.06318299	0.0046	

Breakthrough infection 1 (total count)	0	0.066848912	0.06492624	0.0019	0.0005600
	1	0.180225685	0.17334066	0.0069	
	2	0.106138898	0.1067929	-0.0007	
	3	0.07064484	0.07012345	0.0005	
	4	0.054365377	0.05376669	0.0006	
	5	0.065758058	0.06805123	-0.0023	
	6	0.077903852	0.07653646	0.0014	
	7	0.069478313	0.06897124	0.0005	
	8	0.077862094	0.07544163	0.0024	
	9	0.068139963	0.06628986	0.0019	
	10	0.052019468	0.05154047	0.0005	
	11	0.070239774	0.07038869	-0.0001	
Breakthrough infection 2 (event history)	0	0.060315719	0.05667774	0.0036	0.0041840
	1	0.114239656	0.10119983	0.0130	
	2	0.080599303	0.07410489	0.0065	
	3	0.063488552	0.05945841	0.0040	
	4	0.058155418	0.05477348	0.0034	
	5	0.06361918	0.05957326	0.0040	
	6	0.072703426	0.06741774	0.0053	
	7	0.065760544	0.06143855	0.0043	
	8	0.07106554	0.0660154	0.0051	
	9	0.066758748	0.06233071	0.0044	
	10	0.050794183	0.04821421	0.0026	
	11	0.056699577	0.05348851	0.0032	
Breakthrough infection 2 (total count)	0	0.061202574	0.059257	0.0019	0.0010608
	1	0.119505642	0.11641334	0.0031	
	2	0.083467253	0.0823373	0.0011	
	3	0.065324632	0.06477444	0.0006	

	4	0.059586623	0.05895567	0.0006	
	5	0.06620573	0.0669973	-0.0008	
	6	0.074593516	0.0729045	0.0017	
	7	0.067039776	0.06510651	0.0019	
	8	0.072344616	0.06971089	0.0026	
	9	0.068600368	0.06760873	0.0010	
	10	0.051927843	0.05154223	0.0004	
	11	0.058533145	0.0587783	-0.0002	
CVD (event history)	0	0.000161447	0.00016142	0.0000	0.0000003
	1	0.001504567	0.00150247	0.0000	
	2	0.000840606	0.00083992	0.0000	
	3	0.000387125	0.00038698	0.0000	
	4	0.000617742	0.00061736	0.0000	
	5	0.001716076	0.00171317	0.0000	
	6	0.000635131	0.00063473	0.0000	
	7	0.000519688	0.00051944	0.0000	
	8	0.000346471	0.00034635	0.0000	
	9	0.000460405	0.00046041	0.0000	
	10	0.000815303	0.00081464	0.0000	
	11	0.000211566	0.00021154	0.0000	
CVD (total count)	0	0.000163652	0.00016826	0.0000	-0.0000013
	1	0.001504567	0.00150247	0.0000	
	2	0.000840606	0.00083992	0.0000	
	3	0.000387125	0.00038698	0.0000	
	4	0.00062182	0.00062959	0.0000	
	5	0.001740947	0.0017877	0.0000	
	6	0.000636662	0.00063932	0.0000	
	7	0.000559664	0.00063933	-0.0001	

	8	0.000346471	0.00034635	0.0000	
	9	0.000460405	0.00046041	0.0000	
	10	0.000821515	0.00083327	0.0000	
	11	0.000211566	0.00021154	0.0000	
Blood clot (event history)	0	0.000241729	0.00024167	0.0000	0.0000006
	1	0.001826975	0.00182383	0.0000	
	2	0.00133508	0.00133333	0.0000	
	3	0.000774251	0.00077366	0.0000	
	4	0.00088278	0.000882	0.0000	
	5	0.001044568	0.0010435	0.0000	
	6	0.000820314	0.00081964	0.0000	
	7	0.000919448	0.00091864	0.0000	
	8	0.000338655	0.00033854	0.0000	
	9	0.000460405	0.00046041	0.0000	
	10	0.000678643	0.00067818	0.0000	
	11	0.000282087	0.00028203	0.0000	
Blood clot (total count)	0	0.000243714	0.00024785	0.0000	-0.0000021
	1	0.001826975	0.00182383	0.0000	
	2	0.00133508	0.00133333	0.0000	
	3	0.000774251	0.00077366	0.0000	
	4	0.000888896	0.00090034	0.0000	
	5	0.001044568	0.0010435	0.0000	
	6	0.000831027	0.00085483	0.0000	
	7	0.000959424	0.0010385	-0.0001	
	8	0.00034126	0.00034636	0.0000	
	9	0.000460405	0.00046041	0.0000	
	10	0.000689514	0.00071389	0.0000	
	11	0.000282087	0.00028203	0.0000	

LRTI (event history)	0	0.002415306	0.00240947	0.0000	0.0000457
	1	0.018807093	0.01845537	0.0004	
	2	0.01411724	0.01391829	0.0002	
	3	0.007255835	0.00720327	0.0001	
	4	0.005845104	0.00581095	0.0000	
	5	0.011714087	0.01157715	0.0001	
	6	0.006899212	0.00685162	0.0000	
	7	0.007275635	0.00722299	0.0001	
	8	0.004212353	0.00419462	0.0000	
	9	0.003222836	0.00321393	0.0000	
	10	0.006618711	0.00657491	0.0000	
	11	0.003526093	0.00351391	0.0000	
LRTI (total count)	0	0.002433061	0.00246287	0.0000	-0.0001075
	1	0.019236969	0.01972878	-0.0005	
	2	0.014611714	0.01553589	-0.0009	
	3	0.00733326	0.00743442	-0.0001	
	4	0.005936848	0.0060851	-0.0001	
	5	0.01183844	0.0119473	-0.0001	
	6	0.00699716	0.00715941	-0.0002	
	7	0.007355587	0.00746168	-0.0001	
	8	0.004256638	0.00433231	-0.0001	
	9	0.003222836	0.00321393	0.0000	
	10	0.006704124	0.00688903	-0.0002	
	11	0.003526093	0.00351391	0.0000	
Sepsis (event history)	0	0.000104213	0.0001042	0.0000	0.0000003
	1	0.003224073	0.00321402	0.0000	
	2	0.003041017	0.00303184	0.0000	
	3	0.001117133	0.0011159	0.0000	

	4	0.000750261	0.0007497	0.0000	
	5	0.001815559	0.00181231	0.0000	
	6	0.000506575	0.00050632	0.0000	
	7	0.000559664	0.00055937	0.0000	
	8	0.000237059	0.000237	0.0000	
	9	0	0	0.0000	
	10	0.000583913	0.00058357	0.0000	
	11	0.000282087	0.00028203	0.0000	
Sepsis (total count)	0	0.000104654	0.00010552	0.0000	-0.0000103
	1	0.003331542	0.00353576	-0.0002	
	2	0.003115188	0.00325391	-0.0001	
	3	0.001128194	0.00114906	0.0000	
	4	0.000756377	0.00076804	0.0000	
	5	0.001890171	0.00203587	-0.0001	
	6	0.000511166	0.00052009	0.0000	
	7	0.000559664	0.00055937	0.0000	
	8	0.000244874	0.00026044	0.0000	
	9	0	0	0.0000	
	10	0.000587019	0.00059289	0.0000	
	11	0.000282087	0.00028203	0.0000	
Long COVID	0	0.002542677	0.00253621	0.0000	0.0000187
	1	0.008812466	0.00873575	0.0001	
	2	0.005933691	0.00589863	0.0000	
	3	0.004877779	0.00485404	0.0000	
	4	0.002479123	0.00247298	0.0000	
	5	0.002760645	0.00275309	0.0000	
	6	0.004663243	0.0046415	0.0000	
	7	0.00491705	0.00489307	0.0000	

	8	0.003957058	0.00394141	0.0000	
	9	0.005524862	0.00549687	0.0000	
	10	0.003101259	0.00309165	0.0000	
	11	0.003385049	0.00337383	0.0000	
Mortality	0	0.000800838	0.0008002	0.0000	0.0000160
	1	0.009887157	0.00979045	0.0001	
	2	0.010408683	0.0103006	0.0001	
	3	0.003771707	0.00375752	0.0000	
	4	0.00650566	0.00646335	0.0000	
	5	0.014997016	0.01477247	0.0002	
	6	0.003515415	0.00350306	0.0000	
	7	0.00431741	0.00429894	0.0000	
	8	0.001453613	0.0014515	0.0000	
	9	0.002302026	0.00229778	0.0000	
	10	0.004220943	0.00420313	0.0000	
	11	0.000916784	0.00091601	0.0000	

Conditional Poisson modelled

Outcome of interest	Phenotype Level	Sample Size	Events	Person years	Incidence Rate per 100 person years	Incidence Rate Ratio	LCI	UCI	*p-value*	Non-Robust SE
COVID-19 infection (Binary)	Control	2317760	417477	7139865.34	5.85	1.00 (Reference)	NA	NA	NA	NA
	1	9128	3232	27400.38	11.80	1.87	1.76	2	<0.001	0.0321
	2	38864	9170	105549.34	8.69	1.64	1.58	1.7	<0.001	0.0182
	3	88192	18701	250747.69	7.46	1.15	1.13	1.18	<0.001	0.0117
	4	469685	75716	1238637.72	6.11	1.15	1.14	1.17	<0.001	0.0057
	5	38261	7764	90860.51	8.54	1.62	1.56	1.69	<0.001	0.0197
	6	634222	139201	1932184.26	7.20	1.16	1.15	1.17	<0.001	0.0044
	7	24307	5140	72794.78	7.06	1.14	1.09	1.19	<0.001	0.0224
	8	375569	88435	1134420.74	7.80	1.09	1.08	1.1	<0.001	0.0055
	9	2129	437	5878.64	7.43	1.03	0.89	1.2	0.67	0.0749
	10	623483	106422	1800735.85	5.91	1.03	1.02	1.04	<0.001	0.0049
	Internal Reference Group	13920	2727	38598.32	7.07	1.15	1.09	1.22	<0.001	0.0297
COVID-19 infection (Total Count)	Control	2317760	452814	7139865.34	6.34	1.00 (Reference)	NA	NA	NA	NA
		9128	3832	27400.38	13.99	2.05	1.93	2.17	<0.001	0.0303
	2	38864	10329	105549.34	9.79	1.71	1.65	1.77	<0.001	0.0174
	3	88192	20879	250747.69	8.33	1.17	1.15	1.2	<0.001	0.0111
	4	469685	82112	1238637.72	6.63	1.16	1.14	1.17	<0.001	0.0055
	5	38261	9023	90860.51	9.93	1.73	1.67	1.8	<0.001	0.0186
	6	634222	154048	1932184.26	7.97	1.18	1.17	1.19	<0.001	0.0042

	7	24307	5723	72794.78	7.86	1.16	1.11	1.21	<0.001	0.0213
	8	375569	97826	1134420.74	8.62	1.1	1.08	1.11	<0.001	0.0052
	9	2129	495	5878.64	8.42	1.07	0.93	1.23	0.34	0.0708
	10	623483	116248	1800735.85	6.46	1.03	1.02	1.04	<0.001	0.0047
	Internal Reference Group	13920	3076	38598.32	7.97	1.2	1.14	1.27	<0.001	0.0283
Multiple COVID-19 cases	Control	2317760	32793	7139865.34	0.46	1.00 (Reference)	NA	NA	NA	NA
	1	9128	518	27400.38	1.89	3.74	3.05	4.58	<0.001	0.1037
	2	38864	1001	105549.34	0.95	2.39	2.11	2.7	<0.001	0.0635
	3	88192	1980	250747.69	0.79	1.42	1.32	1.53	<0.001	0.0385
	4	469685	5920	1238637.72	0.48	1.18	1.13	1.23	<0.001	0.021
	5	38261	1095	90860.51	1.21	2.82	2.49	3.2	<0.001	0.0642
	6	634222	13447	1932184.26	0.70	1.41	1.37	1.46	<0.001	0.0153
	7	24307	520	72794.78	0.71	1.33	1.15	1.54	<0.001	0.0744
	8	375569	8613	1134420.74	0.76	1.17	1.13	1.21	<0.001	0.0183
	9	2129	50	5878.64	0.85	1.43	0.9	2.26	0.13	0.2338
	10	623483	9020	1800735.85	0.50	1.08	1.05	1.12	<0.001	0.0175
	11	13920	318	38598.32	0.82	1.7	1.4	2.06	<0.001	0.0991
Breakthrough infection within 3 months of vaccination (Binary)	0	2317760	134458	7139865.34	1.88	1.00 (Reference)	NA	NA	NA	NA
	1	9128	1530	27400.38	5.58	2.57	2.31	2.86	<0.001	0.0549
	2	38864	3926	105549.34	3.72	2.12	2	2.26	<0.001	0.0318
	3	88192	6071	250747.69	2.42	1.19	1.14	1.24	<0.001	0.0222

	4	469685	25116	1238637.72	2.03	1.15	1.13	1.18	<0.001	0.0105
	5	38261	2402	90860.51	2.64	1.54	1.43	1.65	<0.001	0.0368
	6	634222	48188	1932184.26	2.49	1.19	1.18	1.21	<0.001	0.008
	7	24307	1647	72794.78	2.26	1.1	1.02	1.2	0.02	0.0421
	8	375569	28613	1134420.74	2.52	1.04	1.02	1.06	<0.001	0.0104
	9	2129	144	5878.64	2.45	0.97	0.74	1.28	0.85	0.1413
	10	623483	31736	1800735.85	1.76	0.97	0.95	0.99	<0.001	0.0094
	Internal Reference Group	13920	940	38598.32	2.44	1.3	1.17	1.45	<0.001	0.0565
Breakthrough infection within 3 months of vaccination (Total Count)	Control	2317760	136978	7139865.34	1.92	1.00 (Reference)	NA	NA	NA	NA
	1	9128	1636	27400.38	5.97	2.71	2.43	3.01	<0.001	0.0541
	2	38864	4143	105549.34	3.93	2.21	2.08	2.35	<0.001	0.0313
	3	88192	6257	250747.69	2.50	1.2	1.15	1.25	<0.001	0.0219
	4	469685	25651	1238637.72	2.07	1.16	1.13	1.18	<0.001	0.0103
	5	38261	2529	90860.51	2.78	1.59	1.48	1.71	<0.001	0.0362
	6	634222	49638	1932184.26	2.57	1.21	1.19	1.23	<0.001	0.008
	7	24307	1697	72794.78	2.33	1.12	1.03	1.21	0.01	0.0416
	8	375569	29288	1134420.74	2.58	1.05	1.03	1.07	<0.001	0.0103
	9	2129	146	5878.64	2.48	0.95	0.72	1.25	0.73	0.1403
	10	623483	32403	1800735.85	1.80	0.98	0.96	0.99	0.01	0.0093
	Internal Reference Group	13920	974	38598.32	2.52	1.33	1.19	1.48	<0.001	0.0557
Breakthrough infection between 4 and 6	Control	2317760	136235	7139865.34	1.91	1.00 (Reference)	NA	NA	NA	NA

months of vaccination (Binary)										
	1	9128	1046	27400.38	3.82	1.77	1.58	1.99	<0.001	0.059
	2	38864	3148	105549.34	2.98	1.59	1.49	1.69	<0.001	0.0326
	3	88192	5602	250747.69	2.23	1.1	1.05	1.15	<0.001	0.0227
	4	469685	27315	1238637.72	2.21	1.16	1.14	1.18	<0.001	0.01
	5	38261	2456	90860.51	2.70	1.52	1.42	1.63	<0.001	0.0361
	6	634222	46178	1932184.26	2.39	1.14	1.12	1.16	<0.001	0.0081
	7	24307	1611	72794.78	2.21	1.22	1.12	1.33	<0.001	0.0424
	8	375569	26711	1134420.74	2.35	1.06	1.03	1.08	<0.001	0.0107
	9	2129	143	5878.64	2.43	1.15	0.87	1.52	0.31	0.1408
	10	623483	31683	1800735.85	1.76	0.96	0.94	0.98	<0.001	0.0093
	Internal Reference Group	13920	795	38598.32	2.06	1.21	1.07	1.36	<0.001	0.0607
Breakthrough infection between 4 and 6 months of vaccination (Total Count)	Control	2317760	138532	7139865.34	1.94	1.00 (Reference)	NA	NA	NA	NA
	1	9128	1095	27400.38	4.00	1.82	1.63	2.04	<0.001	0.0584
	2	38864	3259	105549.34	3.09	1.61	1.52	1.72	<0.001	0.0322
	3	88192	5767	250747.69	2.30	1.11	1.06	1.16	<0.001	0.0224
	4	469685	27979	1238637.72	2.26	1.16	1.14	1.19	<0.001	0.0099
	5	38261	2558	90860.51	2.82	1.56	1.45	1.67	<0.001	0.0356
	6	634222	47382	1932184.26	2.45	1.15	1.13	1.17	<0.001	0.008
	7	24307	1643	72794.78	2.26	1.22	1.13	1.33	<0.001	0.042
	8	375569	27186	1134420.74	2.40	1.06	1.03	1.08	<0.001	0.0107

	9	2129	147	5878.64	2.50	1.16	0.88	1.52	0.29	0.1386
	10	623483	32382	1800735.85	1.80	0.96	0.95	0.98	<0.001	0.0092
	Internal Reference Group	13920	821	38598.32	2.13	1.26	1.12	1.41	<0.001	0.0601
28-day CVD (Binary)	Control	2317760	812	7139865.34	0.01	1.00 (Reference)	NA	NA	NA	NA
	1	9128	14	27400.38	0.05	6.54	1.4	30.7	0.02	0.7885
	2	38864	32	105549.34	0.03	3.39	1.67	6.88	<0.001	0.3605
	3	88192	35	250747.69	0.01	2.32	1.2	4.47	0.01	0.3353
	4	469685	286	1238637.72	0.02	1.4	1.15	1.71	<0.001	0.101
	5	38261	65	90860.51	0.07	8.78	4.63	16.68	<0.001	0.3271
	6	634222	391	1932184.26	0.02	1.56	1.3	1.88	<0.001	0.0934
	7	24307	12	72794.78	0.02	1.86	0.63	5.44	0.26	0.5486
	8	375569	130	1134420.74	0.01	2.26	1.63	3.15	<0.001	0.1684
	9	2129	<5	-	-	-	-	-	-	-
	10	623483	493	1800735.85	0.03	2.71	2.24	3.27	<0.001	0.097
	Internal Reference Group	13920	<5	-	-	-	-	-	-	-
28-day CVD (Total count)	Control	2317760	824	7139865.34	0.01	1.00 (Reference)	NA	NA	NA	NA
	1	9128	14	27400.38	0.05	6.53	1.39	30.65	0.02	0.7886
	2	38864	32	105549.34	0.03	3.38	1.67	6.84	<0.001	0.3602
	3	88192	35	250747.69	0.01	2.32	1.2	4.48	0.01	0.3352
	4	469685	288	1238637.72	0.02	1.37	1.12	1.66	<0.001	0.1002
	5	38261	66	90860.51	0.07	8.82	4.65	16.71	<0.001	0.3261
	6	634222	392	1932184.26	0.02	1.55	1.29	1.86	<0.001	0.0931

	7	24307	13	72794.78	0.02	2.09	0.73	6	0.17	0.5375
	8	375569	130	1134420.74	0.01	2.27	1.63	3.15	<0.001	0.1684
	9	2129	<5	-	-	-	-	-	-	-
	10	623483	497	1800735.85	0.03	2.69	2.23	3.25	<0.001	0.0963
	Internal Reference Group	13920	<5	-	-	-	-	-	-	-
28-day Blood clot (Binary)	Control	2317760	969	7139865.34	0.01	1.00 (Reference)	NA	NA	NA	NA
	1	9128	16	27400.38	0.06	9.43	2.05	43.36	<0.001	0.7785
	2	38864	50	105549.34	0.05	4.43	2.32	8.47	<0.001	0.3305
	3	88192	68	250747.69	0.03	3.58	2.14	5.99	<0.001	0.2628
	4	469685	409	1238637.72	0.03	2.3	1.92	2.77	<0.001	0.0941
	5	38261	41	90860.51	0.05	1.64	0.92	2.92	0.09	0.2941
	6	634222	527	1932184.26	0.03	1.97	1.67	2.33	<0.001	0.0852
	7	24307	23	72794.78	0.03	2.09	0.92	4.73	0.08	0.4172
	8	375569	129	1134420.74	0.01	1.31	0.96	1.77	0.09	0.1562
	9	2129	<5	-	-	-	-	-	-	-
	10	623483	422	1800735.85	0.02	1.37	1.15	1.64	<0.001	0.0904
	Internal Reference Group	13920	<5	-	-	-	-	-	-	-
28-day Blood clot (Total Count)	Control	2317760	978	7139865.34	0.01	1.00 (Reference)	NA	NA	NA	NA
	1	9128	16	27400.38	0.06	9.36	2.04	43.03	<0.001	0.7783
	2	38864	50	105549.34	0.05	4.46	2.33	8.53	<0.001	0.3311
	3	88192	68	250747.69	0.03	3.58	2.14	5.99	<0.001	0.2628

	4	469685	412	1238637.72	0.03	2.29	1.9	2.75	<0.001	0.0938
	5	38261	41	90860.51	0.05	1.6	0.9	2.83	0.11	0.2909
	6	634222	534	1932184.26	0.03	1.96	1.66	2.32	<0.001	0.0845
	7	24307	24	72794.78	0.03	2.13	0.95	4.8	0.07	0.4147
	8	375569	130	1134420.74	0.01	1.3	0.96	1.77	0.09	0.1557
	9	2129	<5	-	-	-	-	-	-	-
	10	623483	429	1800735.85	0.02	1.39	1.17	1.66	<0.001	0.0902
	Internal Reference Group	13920	<5	-	-	-	-	-	-	-
28-day LRTI (Binary)	Control	2317760	8367	7139865.34	0.12	1.00 (Reference)	NA	NA	NA	NA
	1	9128	171	27400.38	0.62	9.91	6.07	16.2	<0.001	0.2505
	2	38864	552	105549.34	0.52	4.53	3.71	5.54	<0.001	0.1021
	3	88192	643	250747.69	0.26	2.7	2.3	3.18	<0.001	0.0824
	4	469685	2685	1238637.72	0.22	1.46	1.36	1.56	<0.001	0.0341
	5	38261	445	90860.51	0.49	3	2.45	3.66	<0.001	0.1025
	6	634222	4322	1932184.26	0.22	1.88	1.77	1.99	<0.001	0.0296
	7	24307	178	72794.78	0.24	1.83	1.38	2.44	<0.001	0.1467
	8	375569	1571	1134420.74	0.14	1.51	1.37	1.65	<0.001	0.0463
	9	2129	7	5878.64	0.12	1.26	0.41	3.9	0.68	0.5748
	10	623483	4088	1800735.85	0.23	1.78	1.68	1.89	<0.001	0.0308
	Internal Reference Group	13920	50	38598.32	0.13	2.2	1.32	3.68	<0.001	0.2619
28-day LRTI (Total Count)	Control	2317760	8437	7139865.34	0.12	1.00 (Reference)	NA	NA	NA	NA
	1	9128	175	27400.38	0.64	9.49	5.87	15.35	<0.001	0.2453

	2	38864	571	105549.34	0.54	4.69	3.84	5.72	<0.001	0.1016
	3	88192	650	250747.69	0.26	2.7	2.3	3.17	<0.001	0.082
	4	469685	2726	1238637.72	0.22	1.46	1.37	1.56	<0.001	0.0339
	5	38261	450	90860.51	0.50	3.02	2.47	3.69	<0.001	0.1021
	6	634222	4386	1932184.26	0.23	1.88	1.78	2	<0.001	0.0294
	7	24307	180	72794.78	0.25	1.85	1.39	2.46	<0.001	0.1459
	8	375569	1588	1134420.74	0.14	1.5	1.37	1.65	<0.001	0.046
	9	2129	7	5878.64	0.12	1.26	0.41	3.89	0.69	0.5746
	10	623483	4143	1800735.85	0.23	1.8	1.7	1.91	<0.001	0.0307
	Internal Reference Group	13920	50	38598.32	0.13	2.2	1.32	3.68	<0.001	0.2622
28-day Sepsis (Binary)	Control	2317760	559	7139865.34	0.01	1.00 (Reference)	NA	NA	NA	NA
	1	9128	30	27400.38	0.11	51.9	6.68	403.3	<0.001	1.0461
	2	38864	116	105549.34	0.11	46.63	20.58	105.62	<0.001	0.4172
	3	88192	95	250747.69	0.04	11.13	6.19	20.03	<0.001	0.2998
	4	469685	338	1238637.72	0.03	2.96	2.37	3.7	<0.001	0.1139
	5	38261	70	90860.51	0.08	4.37	2.46	7.76	<0.001	0.2932
	6	634222	314	1932184.26	0.02	2.5	1.98	3.16	<0.001	0.1186
	7	24307	14	72794.78	0.02	4.49	1.39	14.49	0.01	0.5973
	8	375569	87	1134420.74	0.01	3.05	1.94	4.81	<0.001	0.2319
	9	2129	<5	-	-	-	-	-	-	-
	10	623483	356	1800735.85	0.02	2.54	2.04	3.17	<0.001	0.113
	Internal Reference Group	13920	<5	-	-	-	-	-	-	-

28-day Sepsis (Total Count)	Control	2317760	562	7139865.34	0.01	1.00 (Reference)	NA	NA	NA	NA
	1	9128	31	27400.38	0.11	51.93	6.69	403.07	<0.001	1.0455
	2	38864	118	105549.34	0.11	47.09	20.82	106.49	<0.001	0.4164
	3	88192	95	250747.69	0.04	11.11	6.17	20	<0.001	0.2998
	4	469685	341	1238637.72	0.03	3	2.4	3.75	<0.001	0.1139
	5	38261	73	90860.51	0.08	4.51	2.55	7.99	<0.001	0.2916
	6	634222	316	1932184.26	0.02	2.52	2	3.18	<0.001	0.1184
	7	24307	14	72794.78	0.02	4.5	1.4	14.48	0.01	0.596
	8	375569	90	1134420.74	0.01	3.14	2	4.93	<0.001	0.2306
	9	2129	<5	-	-	-	-	-	-	-
	10	623483	358	1800735.85	0.02	2.52	2.02	3.14	<0.001	0.1126
	Internal Reference Group	13920	<5	-	-	-	-	-	-	-
Long COVID	Control	2317760	5964	7139865.34	0.08	1.00 (Reference)	NA	NA	NA	NA
	1	9128	80	27400.38	0.29	6.71	3.62	12.46	<0.001	0.3157
	2	38864	233	105549.34	0.22	2.83	2.17	3.69	<0.001	0.1352
	3	88192	437	250747.69	0.17	1.87	1.57	2.23	<0.001	0.0897
	4	469685	1177	1238637.72	0.10	1.15	1.05	1.26	<0.001	0.0466
	5	38261	106	90860.51	0.12	1.76	1.25	2.49	<0.001	0.1762
	6	634222	2977	1932184.26	0.15	1.68	1.57	1.8	<0.001	0.0341
	7	24307	120	72794.78	0.16	2.24	1.58	3.19	<0.001	0.1796
	8	375569	1482	1134420.74	0.13	1.31	1.2	1.43	<0.001	0.045
	9	2129	12	5878.64	0.20	3.84	1	14.73	0.05	0.6862

	10	623483	1933	1800735.85	0.11	1.14	1.05	1.23	<0.001	0.0387
	Internal Reference Group	13920	47	38598.32	0.12	1.66	1.02	2.7	0.04	0.2486
Mortality	Control	2317760	5540	7139865.34	0.08	1.00 (Reference)	NA	NA	NA	NA
	1	9128	91	27400.38	0.33	37.21	14.21	97.48	<0.001	0.4913
	2	38864	393	105549.34	0.37	9.13	6.99	11.94	<0.001	0.1367
	3	88192	321	250747.69	0.13	4.31	3.31	5.62	<0.001	0.135
	4	469685	2935	1238637.72	0.24	2.76	2.56	2.97	<0.001	0.0383
	5	38261	561	90860.51	0.62	3.07	2.54	3.71	<0.001	0.0965
	6	634222	2113	1932184.26	0.11	2.05	1.88	2.24	<0.001	0.0443
	7	24307	101	72794.78	0.14	1.47	1.01	2.13	0.04	0.1897
	8	375569	525	1134420.74	0.05	2.12	1.77	2.54	<0.001	0.0925
	9	2129	5	5878.64	0.09	11.07	1.14	107.64	0.04	1.1603
	10	623483	2530	1800735.85	0.14	2.32	2.13	2.52	<0.001	0.0428
	Internal Reference Group	13920	13	38598.32	0.03	6.36	1.76	23.01	<0.0001	0.6562

Quasipoisson modelled

Outcome of interest	Phenotype Level	Sample Size	Events	Person years	Incidence Rate per 100 person years	Incidence Rate Ratio	LCI	UCI	*p-value*	Non-Robust SE
COVID-19 infection (Binary)	Control	2317760	417477	7139865.34	5.85	1.00 (Reference)	NA	NA	NA	NA
	1	9128	3232	27400.38	11.80	1.87	1.79	1.96	<0.001	0.0224
	2	38864	9170	105549.34	8.69	1.64	1.6	1.68	<0.001	0.0127
	3	88192	18701	250747.69	7.46	1.15	1.13	1.17	<0.001	0.0082
	4	469685	75716	1238637.72	6.11	1.15	1.14	1.16	<0.001	0.004
	5	38261	7764	90860.51	8.54	1.62	1.58	1.67	<0.001	0.0137
	6	634222	139201	1932184.26	7.20	1.16	1.15	1.17	<0.001	0.0031
	7	24307	5140	72794.78	7.06	1.14	1.11	1.18	<0.001	0.0156
	8	375569	88435	1134420.74	7.80	1.09	1.08	1.1	<0.001	0.0038
	9	2129	437	5878.64	7.43	1.03	0.93	1.14	0.55	0.0523
	10	623483	106422	1800735.85	5.91	1.03	1.02	1.04	<0.001	0.0034
	Internal Reference Group	13920	2727	38598.32	7.07	1.15	1.11	1.2	<0.001	0.0208
COVID-19 infection (Total Count)	Control	2317760	452814	7139865.34	6.34	1.00 (Reference)	NA	NA	NA	NA
		9128	3832	27400.38	13.99	2.05	1.96	2.14	<0.001	0.022
	2	38864	10329	105549.34	9.79	1.71	1.67	1.75	<0.001	0.0126
	3	88192	20879	250747.69	8.33	1.17	1.16	1.19	<0.001	0.0081
	4	469685	82112	1238637.72	6.63	1.16	1.15	1.16	<0.001	0.004
	5	38261	9023	90860.51	9.93	1.73	1.69	1.78	<0.001	0.0135
	6	634222	154048	1932184.26	7.97	1.18	1.17	1.19	<0.001	0.0031
	7	24307	5723	72794.78	7.86	1.16	1.13	1.2	<0.001	0.0155
	8	375569	97826	1134420.74	8.62	1.1	1.09	1.1	<0.001	0.0038
	9	2129	495	5878.64	8.42	1.07	0.97	1.18	0.19	0.0514
	10	623483	116248	1800735.85	6.46	1.03	1.03	1.04	<0.001	0.0034
	Internal Reference Group	13920	3076	38598.32	7.97	1.2	1.15	1.25	<0.001	0.0206

Multiple COVID-19 cases	Control	2317760	32793	7139865.34	0.46	1.00 (Reference)	NA	NA	NA	NA
	1	9128	518	27400.38	1.89	3.74	3.59	3.9	<0.001	0.0211
	2	38864	1001	105549.34	0.95	2.39	2.33	2.45	<0.001	0.0129
	3	88192	1980	250747.69	0.79	1.42	1.4	1.44	<0.001	0.0078
	4	469685	5920	1238637.72	0.48	1.18	1.17	1.19	<0.001	0.0043
	5	38261	1095	90860.51	1.21	2.82	2.75	2.9	<0.001	0.0131
	6	634222	13447	1932184.26	0.70	1.41	1.41	1.42	<0.001	0.0031
	7	24307	520	72794.78	0.71	1.33	1.29	1.37	<0.001	0.0152
	8	375569	8613	1134420.74	0.76	1.17	1.16	1.18	<0.001	0.0037
	9	2129	50	5878.64	0.85	1.43	1.3	1.57	<0.001	0.0476
	10	623483	9020	1800735.85	0.50	1.08	1.08	1.09	<0.001	0.0036
	11	13920	318	38598.32	0.82	1.7	1.63	1.77	<0.001	0.0202
Breakthrough infection within 3 months of vaccination(Binary)	0	2317760	134458	7139865.34	1.88	1.00 (Reference)	NA	NA	NA	NA
	1	9128	1530	27400.38	5.58	2.57	2.47	2.67	<0.001	0.0198
	2	38864	3926	105549.34	3.72	2.12	2.08	2.17	<0.001	0.0115
	3	88192	6071	250747.69	2.42	1.19	1.17	1.21	<0.001	0.008
	4	469685	25116	1238637.72	2.03	1.15	1.15	1.16	<0.001	0.0038
	5	38261	2402	90860.51	2.64	1.54	1.5	1.58	<0.001	0.0133
	6	634222	48188	1932184.26	2.49	1.19	1.19	1.2	<0.001	0.0029
	7	24307	1647	72794.78	2.26	1.1	1.07	1.14	<0.001	0.0152
	8	375569	28613	1134420.74	2.52	1.04	1.03	1.05	<0.001	0.0038
	9	2129	144	5878.64	2.45	0.97	0.88	1.08	0.6	0.0511
	10	623483	31736	1800735.85	1.76	0.97	0.96	0.98	<0.001	0.0034
	Internal Reference Group	13920	940	38598.32	2.44	1.3	1.25	1.36	<0.001	0.0204
Breakthrough infection within 3 months of vaccination (Total Count)	Control	2317760	136978	7139865.34	1.92	1.00 (Reference)	NA	NA	NA	NA
	1	9128	1636	27400.38	5.97	2.71	2.6	2.81	<0.001	0.0197
	2	38864	4143	105549.34	3.93	2.21	2.16	2.26	<0.001	0.0114

	3	88192	6257	250747.69	2.50	1.2	1.18	1.22	<0.001	0.008
	4	469685	25651	1238637.72	2.07	1.16	1.15	1.16	<0.001	0.0038
	5	38261	2529	90860.51	2.78	1.59	1.55	1.64	<0.001	0.0132
	6	634222	49638	1932184.26	2.57	1.21	1.2	1.21	<0.001	0.0029
	7	24307	1697	72794.78	2.33	1.12	1.09	1.15	<0.001	0.0152
	8	375569	29288	1134420.74	2.58	1.05	1.04	1.06	<0.001	0.0038
	9	2129	146	5878.64	2.48	0.95	0.86	1.05	0.34	0.0512
	10	623483	32403	1800735.85	1.80	0.98	0.97	0.98	<0.001	0.0034
	Internal Reference Group	13920	974	38598.32	2.52	1.33	1.28	1.38	<0.001	0.0203
Breakthrough infection between 4 and 6 months of vaccination (Binary)	Control	2317760	136235	7139865.34	1.91	1.00 (Reference)	NA	NA	NA	NA
	1	9128	1046	27400.38	3.82	1.77	1.7	1.84	<0.001	0.0214
	2	38864	3148	105549.34	2.98	1.59	1.55	1.62	<0.001	0.0118
	3	88192	5602	250747.69	2.23	1.1	1.08	1.11	<0.001	0.0082
	4	469685	27315	1238637.72	2.21	1.16	1.15	1.17	<0.001	0.0036
	5	38261	2456	90860.51	2.70	1.52	1.48	1.56	<0.001	0.0131
	6	634222	46178	1932184.26	2.39	1.14	1.13	1.14	<0.001	0.0029
	7	24307	1611	72794.78	2.21	1.22	1.18	1.26	<0.001	0.0154
	8	375569	26711	1134420.74	2.35	1.06	1.05	1.06	<0.001	0.0039
	9	2129	143	5878.64	2.43	1.15	1.04	1.27	0.01	0.051
	10	623483	31683	1800735.85	1.76	0.96	0.95	0.97	<0.001	0.0034
	Internal Reference Group	13920	795	38598.32	2.06	1.21	1.16	1.26	<0.001	0.022
Breakthrough infection between 4 and 6 months of vaccination (Total Count)	Control	2317760	138532	7139865.34	1.94	1.00 (Reference)	NA	NA	NA	NA
	1	9128	1095	27400.38	4.00	1.82	1.75	1.9	<0.001	0.0213
	2	38864	3259	105549.34	3.09	1.61	1.58	1.65	<0.001	0.0118
	3	88192	5767	250747.69	2.30	1.11	1.09	1.13	<0.001	0.0082
	4	469685	27979	1238637.72	2.26	1.16	1.16	1.17	<0.001	0.0036

	5	38261	2558	90860.51	2.82	1.56	1.52	1.6	<0.001	0.013
	6	634222	47382	1932184.26	2.45	1.15	1.14	1.16	<0.001	0.0029
	7	24307	1643	72794.78	2.26	1.22	1.19	1.26	<0.001	0.0153
	8	375569	27186	1134420.74	2.40	1.06	1.05	1.06	<0.001	0.0039
	9	2129	147	5878.64	2.50	1.16	1.05	1.28	<0.001	0.0507
	10	623483	32382	1800735.85	1.80	0.96	0.96	0.97	<0.001	0.0034
	Internal Reference Group	13920	821	38598.32	2.13	1.26	1.2	1.31	<0.001	0.022
28-day CVD (Binary)	Control	2317760	812	7139865.34	0.01	1.00 (Reference)	NA	NA	NA	NA
	1	9128	14	27400.38	0.05	6.54	6.06	7.07	<0.001	0.039
	2	38864	32	105549.34	0.03	3.39	3.28	3.51	<0.001	0.0178
	3	88192	35	250747.69	0.01	2.32	2.24	2.4	<0.001	0.0166
	4	469685	286	1238637.72	0.02	1.4	1.39	1.41	<0.001	0.005
	5	38261	65	90860.51	0.07	8.78	8.51	9.07	<0.001	0.0162
	6	634222	391	1932184.26	0.02	1.56	1.55	1.58	<0.001	0.0046
	7	24307	12	72794.78	0.02	1.86	1.76	1.96	<0.001	0.0272
	8	375569	130	1134420.74	0.01	2.26	2.23	2.3	<0.001	0.0083
	9	2129	<5	-	-	-	-	-	-	-
	10	623483	493	1800735.85	0.03	2.71	2.68	2.73	<0.001	0.0048
	Internal Reference Group	13920	<5	-	-	-	-	-	-	-
28-day CVD (Total count)	Control	2317760	824	7139865.34	0.01	1.00 (Reference)	NA	NA	NA	NA
	1	9128	14	27400.38	0.05	6.53	6.05	7.05	<0.001	0.0391
	2	38864	32	105549.34	0.03	3.38	3.26	3.5	<0.001	0.0179
	3	88192	35	250747.69	0.01	2.32	2.25	2.4	<0.001	0.0166
	4	469685	288	1238637.72	0.02	1.37	1.35	1.38	<0.001	0.005
	5	38261	66	90860.51	0.07	8.82	8.54	9.1	<0.001	0.0162
	6	634222	392	1932184.26	0.02	1.55	1.53	1.56	<0.001	0.0046
	7	24307	13	72794.78	0.02	2.09	1.99	2.2	<0.001	0.0267

	8	375569	130	1134420.74	0.01	2.27	2.33	2.3	<0.001	0.0084
	9	2129	<5	-	-	-	-	-	-	-
	10	623483	497	1800735.85	0.03	2.69	2.67	2.72	<0.001	0.0048
	Internal Reference Group	13920	<5	-	-	-	-	-	-	-
28-day Blood clot (Binary)	Control	2317760	969	7139865.34	0.01	1.00 (Reference)	NA	NA	NA	NA
	1	9128	16	27400.38	0.06	9.43	8.61	10.31	<0.001	0.0459
	2	38864	50	105549.34	0.05	4.43	4.26	4.6	<0.001	0.0195
	3	88192	68	250747.69	0.03	3.58	3.47	3.69	<0.001	0.0155
	4	469685	409	1238637.72	0.03	2.3	2.28	2.33	<0.001	0.0056
	5	38261	41	90860.51	0.05	1.64	1.59	1.7	<0.001	0.0174
	6	634222	527	1932184.26	0.03	1.97	1.95	1.99	<0.001	0.005
	7	24307	23	72794.78	0.03	2.09	1.99	2.19	<0.001	0.0246
	8	375569	129	1134420.74	0.01	1.31	1.28	1.33	<0.001	0.0092
	9	2129	<5	-	-	-	-	-	-	-
	10	623483	422	1800735.85	0.02	1.37	1.36	1.38	<0.001	0.0053
	Internal Reference Group	13920	<5	-	-	-	-	-	-	-
28-day Blood clot (Total Count)	Control	2317760	978	7139865.34	0.01	1.00 (Reference)	NA	NA	NA	NA
	1	9128	16	27400.38	0.06	9.36	8.55	10.24	<0.001	0.0461
	2	38864	50	105549.34	0.05	4.46	4.29	4.63	<0.001	0.0196
	3	88192	68	250747.69	0.03	3.58	3.47	3.69	<0.001	0.0155
	4	469685	412	1238637.72	0.03	2.29	2.26	2.31	<0.001	0.0056
	5	38261	41	90860.51	0.05	1.6	1.55	1.65	<0.001	0.0172
	6	634222	534	1932184.26	0.03	1.96	1.94	1.98	<0.001	0.005
	7	24307	24	72794.78	0.03	2.13	2.03	2.24	<0.001	0.0245
	8	375569	130	1134420.74	0.01	1.3	1.28	1.32	<0.001	0.0092
	9	2129	<5	-	-	-	-	-	-	-
	10	623483	429	1800735.85	0.02	1.39	1.38	1.41	<0.001	0.0053

	Internal Reference Group	13920	<5	-	-	-	-	-	-	-
28-day LRTI (Binary)	Control	2317760	8367	7139865.34	0.12	1.00 (Reference)	NA	NA	NA	NA
	1	9128	171	27400.38	0.62	9.91	9.23	10.64	<0.001	0.0363
	2	38864	552	105549.34	0.52	4.53	4.4	4.67	<0.001	0.0148
	3	88192	643	250747.69	0.26	2.7	2.64	2.77	<0.001	0.0119
	4	469685	2685	1238637.72	0.22	1.46	1.44	1.47	<0.001	0.0049
	5	38261	445	90860.51	0.49	3	2.91	3.09	<0.001	0.0148
	6	634222	4322	1932184.26	0.22	1.88	1.86	1.89	<0.001	0.0043
	7	24307	178	72794.78	0.24	1.83	1.76	1.91	<0.001	0.0213
	8	375569	1571	1134420.74	0.14	1.51	1.49	1.53	<0.001	0.0067
	9	2129	7	5878.64	0.12	1.26	1.07	1.49	0.01	0.0833
	10	623483	4088	1800735.85	0.23	1.78	1.77	1.8	<0.001	0.0045
	Internal Reference Group	13920	50	38598.32	0.13	2.2	2.04	2.37	<0.001	0.0379
28-day LRTI (Total Count)	Control	2317760	8437	7139865.34	0.12	1.00 (Reference)	NA	NA	NA	NA
	1	9128	175	27400.38	0.64	9.49	8.85	10.18	<0.001	0.0357
	2	38864	571	105549.34	0.54	4.69	4.55	4.82	<0.001	0.0148
	3	88192	650	250747.69	0.26	2.7	2.64	2.77	<0.001	0.0119
	4	469685	2726	1238637.72	0.22	1.46	1.45	1.48	<0.001	0.0049
	5	38261	450	90860.51	0.50	3.02	2.94	3.11	<0.001	0.0149
	6	634222	4386	1932184.26	0.23	1.88	1.87	1.9	<0.001	0.0043
	7	24307	180	72794.78	0.25	1.85	1.77	1.93	<0.001	0.0213
	8	375569	1588	1134420.74	0.14	1.5	1.48	1.52	<0.001	0.0067
	9	2129	7	5878.64	0.12	1.26	1.07	1.49	0.01	0.0837
	10	623483	4143	1800735.85	0.23	1.8	1.79	1.82	<0.001	0.0045
	Internal Reference Group	13920	50	38598.32	0.13	2.2	2.04	2.37	<0.001	0.0382
28-day Sepsis (Binary)	Control	2317760	559	7139865.34	0.01	1.00 (Reference)	NA	NA	NA	NA
	1	9128	30	27400.38	0.11	51.9	45.85	58.74	<0.001	0.0632

	2	38864	116	105549.34	0.11	46.63	44.38	48.99	<0.001	0.0252
	3	88192	95	250747.69	0.04	11.13	10.74	11.53	<0.001	0.0181
	4	469685	338	1238637.72	0.03	2.96	2.92	3	<0.001	0.0069
	5	38261	70	90860.51	0.08	4.37	4.22	4.52	<0.001	0.0177
	6	634222	314	1932184.26	0.02	2.5	2.47	2.54	<0.001	0.0072
	7	24307	14	72794.78	0.02	4.49	4.19	4.82	<0.001	0.0361
	8	375569	87	1134420.74	0.01	3.05	2.97	3.14	<0.001	0.014
	9	2129	<5	-	-	-	-	-	-	-
	10	623483	356	1800735.85	0.02	2.54	2.51	2.58	<0.001	0.0068
	Internal Reference Group	13920	<5	-	-	-	-	-	-	-
28-day Sepsis (Total Count)	Control	2317760	562	7139865.34	0.01	1.00 (Reference)	NA	NA	NA	NA
	1	9128	31	27400.38	0.11	51.93	45.81	58.88	<0.001	0.0641
	2	38864	118	105549.34	0.11	47.09	44.79	49.5	<0.001	0.0255
	3	88192	95	250747.69	0.04	11.11	10.72	11.52	<0.001	0.0184
	4	469685	341	1238637.72	0.03	3	2.96	3.04	<0.001	0.007
	5	38261	73	90860.51	0.08	4.51	4.36	4.67	<0.001	0.0179
	6	634222	316	1932184.26	0.02	2.52	2.48	2.55	<0.001	0.0073
	7	24307	14	72794.78	0.02	4.5	4.19	4.84	<0.001	0.0365
	8	375569	90	1134420.74	0.01	3.14	3.05	3.22	<0.001	0.0141
	9	2129	0	5878.64	NA	0	0	2136226.18	0.41	12.8202
	10	623483	358	1800735.85	0.02	2.52	2.48	2.55	<0.001	0.0069
	Internal Reference Group	13920	<5	-	-	-	-	-	-	-
Long COVID	Control	2317760	5964	7139865.34	0.08	1.00 (Reference)	NA	NA	NA	NA
	1	9128	80	27400.38	0.29	6.71	6.33	7.12	<0.001	0.0301
	2	38864	233	105549.34	0.22	2.83	2.76	2.9	<0.001	0.0129
	3	88192	437	250747.69	0.17	1.87	1.84	1.9	<0.001	0.0086
	4	469685	1177	1238637.72	0.10	1.15	1.14	1.16	<0.001	0.0044

	5	38261	106	90860.51	0.12	1.76	1.71	1.82	<0.001	0.0168
	6	634222	2977	1932184.26	0.15	1.68	1.67	1.69	<0.001	0.0032
	7	24307	120	72794.78	0.16	2.24	2.17	2.32	<0.001	0.0171
	8	375569	1482	1134420.74	0.13	1.31	1.3	1.33	<0.001	0.0043
	9	2129	12	5878.64	0.20	3.84	3.38	4.36	<0.001	0.0655
	10	623483	1933	1800735.85	0.11	1.14	1.13	1.14	<0.001	0.0037
	Internal Reference Group	13920	47	38598.32	0.12	1.66	1.58	1.74	<0.001	0.0237
Mortality	Control	2317760	5540	7139865.34	0.08	1.00 (Reference)	NA	NA	NA	NA
	1	9128	91	27400.38	0.33	37.21	29.57	46.83	<0.001	0.1172
	2	38864	393	105549.34	0.37	9.13	8.57	9.74	<0.001	0.0326
	3	88192	321	250747.69	0.13	4.31	4.05	4.59	<0.001	0.0322
	4	469685	2935	1238637.72	0.24	2.76	2.71	2.81	<0.001	0.0092
	5	38261	561	90860.51	0.62	3.07	2.94	3.21	<0.001	0.023
	6	634222	2113	1932184.26	0.11	2.05	2.01	2.09	<0.001	0.0106
	7	24307	101	72794.78	0.14	1.47	1.34	1.6	<0.001	0.0453
	8	375569	525	1134420.74	0.05	2.12	2.03	2.21	<0.001	0.0221
	9	2129	5	5878.64	0.09	11.07	6.44	19.06	<0.001	0.2769
	10	623483	2530	1800735.85	0.14	2.32	2.27	2.36	<0.001	0.0102
	Internal Reference Group	13920	13	38598.32	0.03	6.36	4.68	8.64	<0.001	0.1566

Appendix 24: Secondary Analysis

Age-Sex Unmatched & Unadjusted IRRs of Outcomes of Interest by IS + IRG subgroup

Outcome of interest	Phenotype Level	Sample Size	Events	Person years	Incidence Rate per 100 person years	Incidence Rate Ratio	LCI	UCI	*p-value*	Robust SE	Non-Robust SE
COVID-19 infection (Binary)	Control	9068001	1860895	26698671.45	6.97	1.00 (Reference)	NA	NA	NA	NA	NA
	1	9305	3293	27923.14	11.79	1.69	1.63	1.75	<0.001	0.0134	0.0174
	2	40447	9503	109519.48	8.68	1.24	1.22	1.27	<0.001	0.0088	0.0103
	3	90410	19150	256829.22	7.46	1.07	1.05	1.09	<0.001	0.0063	0.0073
	4	490496	78770	1290741.44	6.10	0.88	0.87	0.89	<0.001	0.0033	0.0036
	5	40208	8097	95140.70	8.51	1.22	1.19	1.25	<0.001	0.0097	0.0111
	6	653408	142922	1989231.83	7.18	1.03	1.02	1.04	<0.001	0.0024	0.0027
	7	25015	5258	74860.65	7.02	1.01	0.98	1.04	0.53	0.0121	0.0138
	8	383871	90335	1159358.73	7.79	1.12	1.11	1.13	<0.001	0.0029	0.0034
	9	2172	445	6003.18	7.41	1.06	0.97	1.16	0.14	0.0413	0.0474
	10	643932	109782	1857655.21	5.91	0.85	0.84	0.86	<0.001	0.0028	0.0031
	Internal Reference Group	14180	2773	39313.56	7.05	1.01	0.97	1.05	0.47	0.0166	0.019
COVID-19 infection (Total Count)	Control	9068001	2034521	26698671.45	7.62	1.00 (Reference)	NA	NA	NA	NA	NA
		9305	3906	27923.14	13.99	1.84	1.78	1.90	<0.001	0.015	0.016

	2	40447	10698	109519.48	9.77	1.28	1.26	1.30	<0.001	0.0095	0.0097
	3	90410	21373	256829.22	8.32	1.09	1.08	1.10	<0.001	0.0067	0.0069
	4	490496	85451	1290741.44	6.62	0.87	0.86	0.88	<0.001	0.0034	0.0035
	5	40208	9397	95140.70	9.88	1.3	1.27	1.33	<0.001	0.0105	0.0103
	6	653408	158159	1989231.83	7.95	1.04	1.03	1.05	<0.001	0.0025	0.0026
	7	25015	5850	74860.65	7.81	1.03	1.00	1.06	0.05	0.0129	0.0131
	8	383871	99940	1159358.73	8.62	1.13	1.12	1.14	<0.001	0.0031	0.0032
	9	2172	504	6003.18	8.40	1.1	1.01	1.20	0.03	0.0444	0.0445
	10	643932	119941	1857655.21	6.46	0.85	0.85	0.86	<0.001	0.0029	0.003
	Internal Reference Group	14180	3130	39313.56	7.96	1.04	1.00	1.08	0.01	0.0177	0.0179
Multiple COVID-19 cases	Control	9068001	161099	26698671.45	0.60	1.00 (Reference)	NA	NA	NA	NA	NA
	1	9305	530	27923.14	1.90	3.15	2.89	3.43	<0.001	0.0419	0.0435
	2	40447	1031	109519.48	0.94	1.56	1.47	1.66	<0.001	0.0308	0.0312
	3	90410	2017	256829.22	0.79	1.3	1.24	1.36	<0.001	0.0221	0.0224
	4	490496	6173	1290741.44	0.48	0.79	0.77	0.81	<0.001	0.0129	0.013
	5	40208	1135	95140.70	1.19	1.98	1.87	2.10	<0.001	0.0292	0.0298
	6	653408	13803	1989231.83	0.69	1.15	1.13	1.17	<0.001	0.0088	0.0089
	7	25015	528	74860.65	0.71	1.17	1.07	1.27	<0.001	0.043	0.0436
	8	383871	8809	1159358.73	0.76	1.26	1.23	1.29	<0.001	0.0108	0.0109
	9	2172	51	6003.18	0.85	1.41	1.07	1.86	0.01	0.1381	0.1401
	10	643932	9324	1857655.21	0.50	0.83	0.81	0.85	<0.001	0.0106	0.0107
	11	14180	324	39313.56	0.82	1.37	1.23	1.53	<0.001	0.0548	0.0556

Breakthrough infection within 3 months of vaccination (Binary)	0	9068001	594811	26698671.45	2.23	1.00 (Reference)	NA	NA	NA	NA	NA
	1	9305	1565	27923.14	5.60	2.52	2.40	2.65	<0.001	0.0226	0.0253
	2	40447	4067	109519.48	3.71	1.67	1.62	1.72	<0.001	0.0147	0.0157
	3	90410	6199	256829.22	2.41	1.08	1.05	1.11	<0.001	0.0122	0.0128
	4	490496	26101	1290741.44	2.02	0.91	0.90	0.92	<0.001	0.0061	0.0063
	5	40208	2514	95140.70	2.64	1.19	1.14	1.24	<0.001	0.0191	0.02
	6	653408	49411	1989231.83	2.48	1.11	1.10	1.12	<0.001	0.0045	0.0047
	7	25015	1686	74860.65	2.25	1.01	0.96	1.06	0.64	0.0234	0.0244
	8	383871	29206	1159358.73	2.52	1.13	1.12	1.14	<0.001	0.0057	0.006
	9	2172	145	6003.18	2.42	1.08	0.92	1.27	0.31	0.0795	0.0831
	10	643932	32800	1857655.21	1.77	0.79	0.78	0.80	<0.001	0.0055	0.0057
	Internal Reference Group	14180	961	39313.56	2.44	1.1	1.03	1.17	<0.001	0.0309	0.0323
Breakthrough infection within 3 months of vaccination (Total Count)	Control	9068001	606190	26698671.45	2.27	1.00 (Reference)	NA	NA	NA	NA	NA
	1	9305	1677	27923.14	6.01	2.65	2.53	2.78	<0.001	0.0235	0.0245
	2	40447	4293	109519.48	3.92	1.73	1.68	1.78	<0.001	0.0152	0.0153
	3	90410	6387	256829.22	2.49	1.1	1.07	1.13	<0.001	0.0124	0.0126
	4	490496	26666	1290741.44	2.07	0.91	0.90	0.92	<0.001	0.0062	0.0063
	5	40208	2644	95140.70	2.78	1.22	1.17	1.27	<0.001	0.0196	0.0195

	6	653408	50903	1989231.83	2.56	1.13	1.12	1.14	<0.001	0.0045	0.0046
	7	25015	1738	74860.65	2.32	1.02	0.97	1.07	0.35	0.0238	0.024
	8	383871	29889	1159358.73	2.58	1.14	1.13	1.15	<0.001	0.0058	0.0059
	9	2172	148	6003.18	2.47	1.09	0.93	1.28	0.31	0.0803	0.0822
	10	643932	33497	1857655.21	1.80	0.79	0.78	0.80	<0.001	0.0056	0.0056
	Internal Reference Group	14180	996	39313.56	2.53	1.12	1.05	1.19	<0.001	0.0315	0.0317
Breakthrough infection between 4 and 6 months of vaccination (Binary)	Control	9068001	546947	26698671.45	2.05	1.00 (Reference)	NA	NA	NA	NA	NA
	1	9305	1063	27923.14	3.81	1.86	1.75	1.98	<0.001	0.0285	0.0307
	2	40447	3260	109519.48	2.98	1.45	1.40	1.50	<0.001	0.0167	0.0176
	3	90410	5740	256829.22	2.23	1.09	1.06	1.12	<0.001	0.0127	0.0133
	4	490496	28525	1290741.44	2.21	1.08	1.07	1.09	<0.001	0.0058	0.0061
	5	40208	2558	95140.70	2.69	1.31	1.26	1.36	<0.001	0.0189	0.0198
	6	653408	47505	1989231.83	2.39	1.17	1.16	1.18	<0.001	0.0046	0.0048
	7	25015	1645	74860.65	2.20	1.07	1.02	1.12	<0.001	0.0237	0.0247
	8	383871	27280	1159358.73	2.35	1.15	1.14	1.16	<0.001	0.0059	0.0062
	9	2172	145	6003.18	2.42	1.18	1.00	1.39	0.04	0.0799	0.0831
	10	643932	32708	1857655.21	1.76	0.86	0.85	0.87	<0.001	0.0055	0.0057
	Internal Reference Group	14180	804	39313.56	2.05	1	0.93	1.07	0.96	0.034	0.0353

Breakthrough infection between 4 and 6 months of vaccination (Total Count)	Control	9068001	554989	26698671.45	2.08	1.00 (Reference)	NA	NA	NA	NA	NA
	1	9305	1112	27923.14	3.98	1.92	1.81	2.04	<0.001	0.0293	0.03
	2	40447	3376	109519.48	3.08	1.48	1.43	1.53	<0.001	0.017	0.0173
	3	90410	5906	256829.22	2.30	1.11	1.08	1.14	<0.001	0.0129	0.0131
	4	490496	29227	1290741.44	2.26	1.09	1.08	1.10	<0.001	0.0059	0.006
	5	40208	2662	95140.70	2.80	1.35	1.30	1.40	<0.001	0.0193	0.0194
	6	653408	48740	1989231.83	2.45	1.18	1.17	1.19	<0.001	0.0046	0.0047
	7	25015	1677	74860.65	2.24	1.08	1.03	1.13	<0.001	0.024	0.0245
	8	383871	27771	1159358.73	2.40	1.15	1.14	1.16	<0.001	0.006	0.0061
	9	2172	149	6003.18	2.48	1.19	1.01	1.40	0.03	0.0809	0.0819
	10	643932	33438	1857655.21	1.80	0.87	0.86	0.88	<0.001	0.0056	0.0056
	Internal Reference Group	14180	830	39313.56	2.11	1.02	0.95	1.09	0.65	0.0346	0.0347
28-day CVD (Binary)	Control	9068001	1464	26698671.45	0.01	1.00 (Reference)	NA	NA	NA	NA	NA
	1	9305	14	27923.14	0.05	9.14	5.40	15.47	<0.001	0.2684	0.2685
	2	40447	34	109519.48	0.03	5.66	4.03	7.95	<0.001	0.1734	0.1735
	3	90410	35	256829.22	0.01	2.49	1.78	3.48	<0.001	0.171	0.171
	4	490496	303	1290741.44	0.02	4.28	3.78	4.84	<0.001	0.0631	0.0631
	5	40208	69	95140.70	0.07	13.23	10.39	16.84	<0.001	0.1231	0.1232
	6	653408	415	1989231.83	0.02	3.8	3.41	4.24	<0.001	0.0556	0.0556
	7	25015	13	74860.65	0.02	3.17	1.84	5.47	<0.001	0.2785	0.2786

	8	383871	133	1159358.73	0.01	2.09	1.75	2.50	<0.001	0.0905	0.0906
	9	2172	<5	-	-	-	-	-	-	-	-
	10	643932	525	1857655.21	0.03	5.15	4.66	5.69	<0.001	0.0509	0.0509
	Internal Reference Group	14180	<5	-	-	-	-	-	-	-	-
28-day CVD (Total count)	Control	9068001	1484	26698671.45	0.01	1.00 (Reference)	NA	NA	NA	NA	NA
	1	9305	14	27923.14	0.05	9.02	5.33	15.27	<0.001	0.2684	0.2685
	2	40447	34	109519.48	0.03	5.59	3.98	7.85	<0.001	0.1735	0.1735
	3	90410	35	256829.22	0.01	2.45	1.75	3.43	<0.001	0.171	0.171
	4	490496	305	1290741.44	0.02	4.25	3.76	4.81	<0.001	0.0633	0.0629
	5	40208	70	95140.70	0.07	13.24	10.42	16.83	<0.001	0.124	0.1223
	6	653408	416	1989231.83	0.02	3.76	3.37	4.19	<0.001	0.0557	0.0555
	7	25015	14	74860.65	0.02	3.36	1.99	5.69	<0.001	0.2869	0.2685
	8	383871	133	1159358.73	0.01	2.06	1.73	2.46	<0.001	0.0906	0.0905
	9	2172	<5	-	-	-	-	-	-	-	-
	10	643932	529	1857655.21	0.03	5.12	4.64	5.65	<0.001	0.0511	0.0506
	Internal Reference Group	14180	<5	-	-	-	-	-	-	-	-
28-day Blood clot (Binary)	Control	9068001	2193	26698671.45	0.01	1.00 (Reference)	NA	NA	NA	NA	NA
	1	9305	17	27923.14	0.06	7.42	4.60	11.96	<0.001	0.2432	0.2435
	2	40447	54	109519.48	0.05	6.01	4.59	7.87	<0.001	0.1377	0.1377
	3	90410	70	256829.22	0.03	3.32	2.62	4.21	<0.001	0.1214	0.1214

	4	490496	433	1290741.44	0.03	4.09	3.69	4.53	<0.001	0.0526	0.0526
	5	40208	42	95140.70	0.04	5.38	3.96	7.30	<0.001	0.1557	0.1558
	6	653408	536	1989231.83	0.03	3.28	2.98	3.60	<0.001	0.0482	0.0482
	7	25015	23	74860.65	0.03	3.74	2.48	5.64	<0.001	0.2095	0.2096
	8	383871	130	1159358.73	0.01	1.37	1.15	1.64	<0.001	0.0903	0.0903
	9	2172	<5	-	-	-	-	-	-	-	-
	10	643932	437	1857655.21	0.02	2.87	2.59	3.18	<0.001	0.0524	0.0524
	Internal Reference Group	14180	<5	-	-	-	-	-	-	-	-
28-day Blood clot (Total Count)	Control	9068001	2211	26698671.45	0.01	1.00 (Reference)	NA	NA	NA	NA	NA
	1	9305	17	27923.14	0.06	7.35	4.56	11.85	<0.001	0.2432	0.2435
	2	40447	54	109519.48	0.05	5.96	4.55	7.81	<0.001	0.1377	0.1377
	3	90410	70	256829.22	0.03	3.29	2.59	4.17	<0.001	0.1214	0.1214
	4	490496	436	1290741.44	0.03	4.08	3.68	4.52	<0.001	0.0528	0.0524
	5	40208	42	95140.70	0.04	5.33	3.93	7.23	<0.001	0.1557	0.1558
	6	653408	543	1989231.83	0.03	3.3	3.00	3.62	<0.001	0.0485	0.0479
	7	25015	24	74860.65	0.03	3.87	2.59	5.79	<0.001	0.2135	0.2052
	8	383871	131	1159358.73	0.01	1.37	1.15	1.63	<0.001	0.0906	0.0899
	9	2172	<5	-	-	-	-	-	-	-	-
	10	643932	444	1857655.21	0.02	2.89	2.61	3.20	<0.001	0.0528	0.052
	Internal Reference Group	14180	<5	-	-	-	-	-	-	-	-

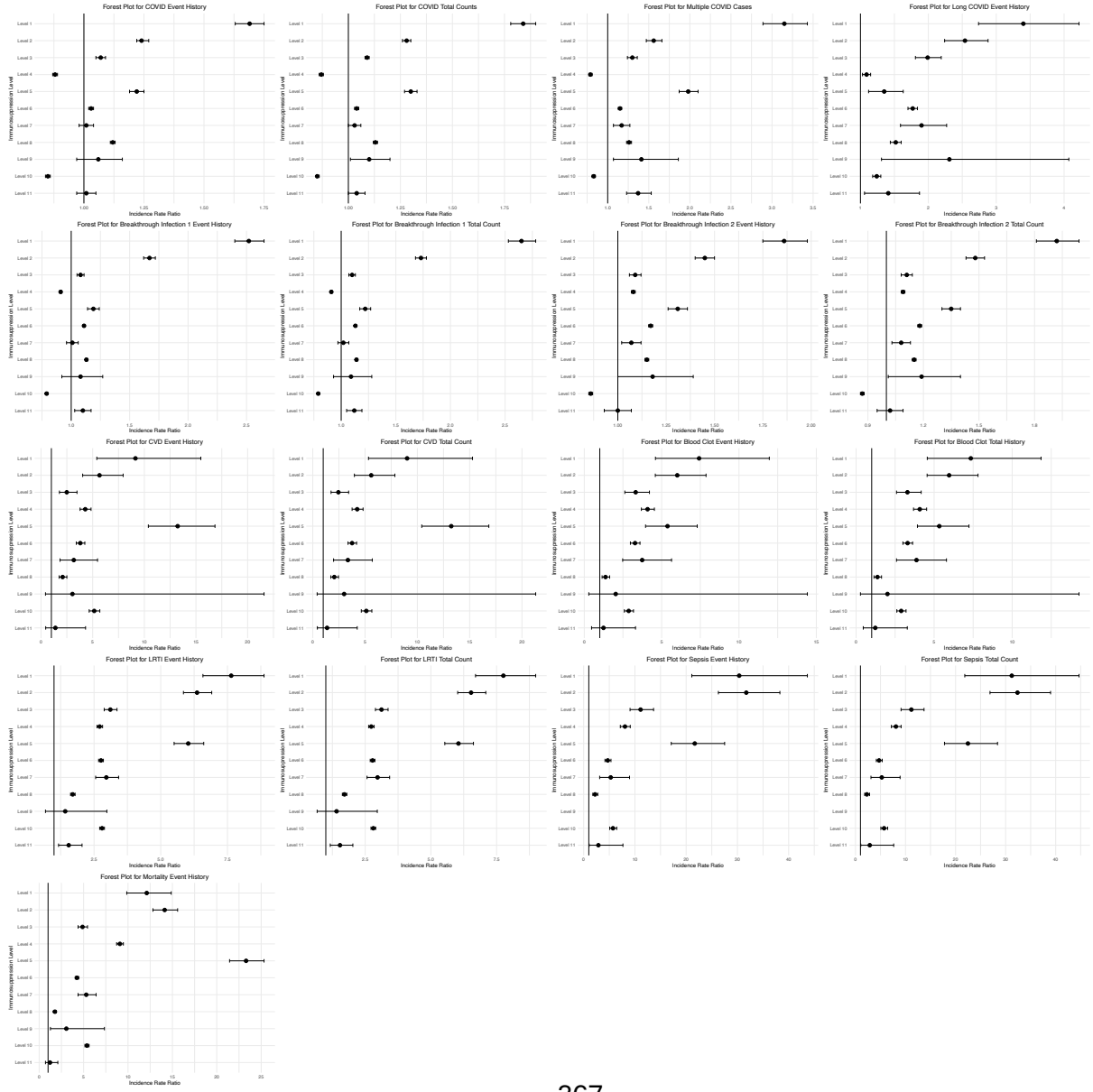
28-day LRTI (Binary)	Control	9068001	21903	26698671.45	0.08	1.00 (Reference)	NA	NA	NA	NA	NA
	1	9305	175	27923.14	0.63	7.64	6.58	8.87	<0.001	0.0751	0.0759
	2	40447	571	109519.48	0.52	6.36	5.85	6.91	<0.001	0.0421	0.0424
	3	90410	656	256829.22	0.26	3.11	2.88	3.36	<0.001	0.0395	0.0396
	4	490496	2867	1290741.44	0.22	2.71	2.61	2.82	<0.001	0.0198	0.0199
	5	40208	471	95140.70	0.50	6.03	5.50	6.61	<0.001	0.0463	0.0466
	6	653408	4508	1989231.83	0.23	2.76	2.67	2.85	<0.001	0.0163	0.0164
	7	25015	182	74860.65	0.24	2.96	2.56	3.42	<0.001	0.0742	0.0744
	8	383871	1617	1159358.73	0.14	1.7	1.62	1.79	<0.001	0.0257	0.0258
	9	2172	7	6003.18	0.12	1.42	0.68	2.98	0.35	0.3774	0.378
	10	643932	4262	1857655.21	0.23	2.8	2.71	2.89	<0.001	0.0167	0.0167
	Internal Reference Group	14180	50	39313.56	0.13	1.55	1.17	2.05	<0.001	0.1413	0.1416
28-day LRTI (Total Count)	Control	9068001	22064	26698671.45	0.08	1.00 (Reference)	NA	NA	NA	NA	NA
	1	9305	179	27923.14	0.64	7.76	6.70	8.99	<0.001	0.0759	0.075
	2	40447	591	109519.48	0.54	6.53	6.02	7.09	<0.001	0.0429	0.0417
	3	90410	663	256829.22	0.26	3.12	2.89	3.37	<0.001	0.0397	0.0394
	4	490496	2912	1290741.44	0.23	2.73	2.63	2.84	<0.001	0.0199	0.0197
	5	40208	476	95140.70	0.50	6.05	5.53	6.62	<0.001	0.0465	0.0463
	6	653408	4572	1989231.83	0.23	2.78	2.69	2.87	<0.001	0.0164	0.0162
	7	25015	184	74860.65	0.25	2.97	2.57	3.43	<0.001	0.0746	0.074
	8	383871	1634	1159358.73	0.14	1.71	1.63	1.80	<0.001	0.0259	0.0256

	9	2172	7	6003.18	0.12	1.41	0.67	2.96	0.36	0.3774	0.378
	10	643932	4317	1857655.21	0.23	2.81	2.72	2.90	<0.001	0.0168	0.0166
	Internal Reference Group	14180	50	39313.56	0.13	1.54	1.17	2.03	<0.001	0.1413	0.1416
28-day Sepsis (Binary)	Control	9068001	945	26698671.45	0.00	1.00 (Reference)	NA	NA	NA	NA	NA
	1	9305	30	27923.14	0.11	30.35	21.10	43.65	<0.001	0.1852	0.1854
	2	40447	123	109519.48	0.11	31.73	26.29	38.29	<0.001	0.0958	0.0959
	3	90410	101	256829.22	0.04	11.11	9.05	13.64	<0.001	0.1047	0.1047
	4	490496	368	1290741.44	0.03	8.06	7.15	9.09	<0.001	0.0614	0.0614
	5	40208	73	95140.70	0.08	21.68	17.09	27.51	<0.001	0.1214	0.1215
	6	653408	331	1989231.83	0.02	4.7	4.15	5.33	<0.001	0.0639	0.0639
	7	25015	14	74860.65	0.02	5.28	3.12	8.95	<0.001	0.2692	0.2692
	8	383871	91	1159358.73	0.01	2.22	1.79	2.75	<0.001	0.1098	0.1098
	9	2172	<5	-	-	-	-	-	-	-	-
	10	643932	376	1857655.21	0.02	5.72	5.08	6.45	<0.001	0.061	0.061
	Internal Reference Group	14180	<5	-	-	-	-	-	-	-	-
28-day Sepsis (Total Count)	Control	9068001	949	26698671.45	0.00	1.00 (Reference)	NA	NA	NA	NA	NA
	1	9305	31	27923.14	0.11	31.23	21.84	44.66	<0.001	0.1879	0.1825
	2	40447	126	109519.48	0.12	32.37	26.88	38.98	<0.001	0.0968	0.0948
	3	90410	102	256829.22	0.04	11.17	9.11	13.70	<0.001	0.1051	0.1042
	4	490496	371	1290741.44	0.03	8.09	7.18	9.12	<0.001	0.0616	0.0612

	5	40208	76	95140.70	0.08	22.47	17.79	28.38	<0.001	0.1234	0.1192
	6	653408	334	1989231.83	0.02	4.72	4.17	5.35	<0.001	0.0641	0.0636
	7	25015	14	74860.65	0.02	5.26	3.10	8.92	<0.001	0.2692	0.2692
	8	383871	94	1159358.73	0.01	2.28	1.84	2.82	<0.001	0.1113	0.1081
	9	2172	<5	-	-	-	-	-	-	-	-
	10	643932	378	1857655.21	0.02	5.72	5.08	6.44	<0.001	0.0611	0.0608
	Internal Reference Group	14180	<5	-	-	-	-	-	-	-	-
Long COVID	Control	9068001	23057	26698671.45	0.09	1.00 (Reference)	NA	NA	NA	NA	NA
	1	9305	82	27923.14	0.29	3.4	2.74	4.22	<0.001	0.1101	0.1106
	2	40447	240	109519.48	0.22	2.54	2.24	2.88	<0.001	0.0646	0.0649
	3	90410	441	256829.22	0.17	1.99	1.81	2.19	<0.001	0.0479	0.0481
	4	490496	1216	1290741.44	0.09	1.09	1.03	1.15	<0.001	0.0294	0.0294
	5	40208	111	95140.70	0.12	1.35	1.12	1.63	<0.001	0.095	0.0951
	6	653408	3047	1989231.83	0.15	1.77	1.70	1.84	<0.001	0.0192	0.0193
	7	25015	123	74860.65	0.16	1.9	1.59	2.27	<0.001	0.0902	0.0904
	8	383871	1519	1159358.73	0.13	1.52	1.44	1.60	<0.001	0.0264	0.0265
	9	2172	12	6003.18	0.20	2.31	1.31	4.07	<0.001	0.2878	0.2888
	10	643932	1997	1857655.21	0.11	1.24	1.18	1.30	<0.001	0.0233	0.0233
	Internal Reference Group	14180	48	39313.56	0.12	1.41	1.06	1.87	0.02	0.1442	0.1445
Mortality	Control	9068001	7263	26698671.40	0.03	1.00 (Reference)	NA	NA	NA	NA	NA

	1	9305	92	27923.14	0.33	12.11	9.86	14.87	<0.001	0.1049	0.1049
	2	40447	421	109519.48	0.38	14.13	12.81	15.59	<0.001	0.0501	0.0501
	3	90410	341	256829.22	0.13	4.88	4.38	5.44	<0.001	0.0554	0.0554
	4	490496	3191	1290741.44	0.25	9.09	8.72	9.48	<0.001	0.0213	0.0212
	5	40208	603	95140.70	0.63	23.3	21.44	25.32	<0.001	0.0424	0.0424
	6	653408	2297	1989231.83	0.12	4.25	4.06	4.45	<0.001	0.0239	0.0239
	7	25015	108	74860.65	0.14	5.3	4.38	6.41	<0.001	0.097	0.0969
	8	383871	558	1159358.73	0.05	1.77	1.62	1.93	<0.001	0.0439	0.0439
	9	2172	5	6003.18	0.08	3.06	1.27	7.35	0.01	0.4478	0.4474
	10	643932	2718	1857655.21	0.15	5.38	5.15	5.62	<0.001	0.0225	0.0225
	Internal Reference Group	14180	13	39313.56	0.03	1.22	0.71	2.10	0.48	0.2776	0.2776

Summary Forest Plot of Age-Sex Unmatched & Unadjusted IRRs of Outcomes of Interest by IS + IRG subgroup



Age-Sex Matched & Unadjusted IRRs of Outcomes of Interest by IS + IRG subgroup

Outcome of interest	Phenotype Level	Sample Size	Events	Person years	Incidence Rate per 100 person years	Incidence Rate Ratio	LCI	UCI	*p-value*	Non-Robust SE
COVID-19 infection (Binary)	Control	2358651	425132	7265595.80	5.85	1.00 (Reference)	NA	NA	NA	NA
	1	9280	3289	27863.45	11.80	1.95	1.84	2.08	<0.001	0.0312
	2	39486	9332	107246.05	8.70	1.72	1.66	1.78	<0.001	0.0177
	3	89759	19064	255201.35	7.47	1.14	1.12	1.17	<0.001	0.0112
	4	477162	76986	1258294.97	6.12	1.19	1.18	1.2	<0.001	0.0056
	5	38926	7904	92553.88	8.54	1.6	1.54	1.66	<0.001	0.0189
	6	645309	141722	1966312.27	7.21	1.24	1.23	1.25	<0.001	0.0042
	7	24699	5218	74016.48	7.05	1.15	1.1	1.2	<0.001	0.0217
	8	382410	90118	1155442.40	7.80	1.14	1.13	1.15	<0.001	0.0052
	9	2159	445	5962.95	7.46	1.11	0.96	1.28	0.15	0.0727
	10	635288	108579	1834828.20	5.92	1.04	1.03	1.05	<0.001	0.0046
	Internal Reference Group	14173	2772	39296.00	7.05	1.05	0.99	1.11	0.08	0.0285
COVID-19 infection (Total Count)	Control	2358651	461154	7265595.80	6.35	1.00 (Reference)	NA	NA	NA	NA
		9280	3902	27863.45	14.00	2.14	2.02	2.27	<0.001	0.0295
	2	39486	10508	107246.05	9.80	1.79	1.73	1.85	<0.001	0.0169
	3	89759	21278	255201.35	8.34	1.17	1.14	1.19	<0.001	0.0107
	4	477162	83509	1258294.97	6.64	1.19	1.18	1.21	<0.001	0.0054
	5	38926	9184	92553.88	9.92	1.71	1.65	1.77	<0.001	0.0179
	6	645309	156852	1966312.27	7.98	1.26	1.25	1.27	<0.001	0.004
	7	24699	5807	74016.48	7.85	1.17	1.13	1.22	<0.001	0.0206
	8	382410	99703	1155442.40	8.63	1.15	1.14	1.16	<0.001	0.005
	9	2159	504	5962.95	8.45	1.14	1	1.31	0.05	0.0687
	10	635288	118629	1834828.20	6.47	1.05	1.04	1.06	<0.001	0.0044

	Internal Reference Group	14173	3129	39296.00	7.96	1.1	1.04	1.16	<0.001	0.0271
Multiple COVID-19 cases	Control	2358651	33417	7265595.80	0.46	1.00 (Reference)	NA	NA	NA	NA
	1	9280	530	27863.45	1.90	3.97	3.26	4.83	<0.001	0.1001
	2	39486	1015	107246.05	0.95	2.52	2.24	2.84	<0.001	0.0613
	3	89759	2011	255201.35	0.79	1.41	1.31	1.52	<0.001	0.0366
	4	477162	6029	1258294.97	0.48	1.23	1.18	1.28	<0.001	0.0201
	5	38926	1115	92553.88	1.20	2.8	2.49	3.16	<0.001	0.061
	6	645309	13705	1966312.27	0.70	1.55	1.5	1.59	<0.001	0.0145
	7	24699	525	74016.48	0.71	1.38	1.2	1.59	<0.001	0.0711
	8	382410	8791	1155442.40	0.76	1.27	1.22	1.31	<0.001	0.0173
	9	2159	51	5962.95	0.86	1.48	0.95	2.29	0.08	0.224
	10	635288	9222	1834828.20	0.50	1.15	1.11	1.19	<0.001	0.0162
	11	14173	324	39296.00	0.82	1.59	1.32	1.91	<0.001	0.0932
Breakthrough infection within 3 months of vaccination(Binary)	0	2358651	136882	7265595.80	1.88	1.00 (Reference)	NA	NA	NA	NA
	1	9280	1562	27863.45	5.61	2.74	2.48	3.02	<0.001	0.0511
	2	39486	4003	107246.05	3.73	2.25	2.13	2.39	<0.001	0.0293
	3	89759	6171	255201.35	2.42	1.16	1.11	1.2	<0.001	0.0198
	4	477162	25531	1258294.97	2.03	1.22	1.19	1.24	<0.001	0.0097
	5	38926	2448	92553.88	2.64	1.48	1.38	1.58	<0.001	0.0334
	6	645309	49019	1966312.27	2.49	1.33	1.31	1.35	<0.001	0.0073
	7	24699	1674	74016.48	2.26	1.12	1.04	1.2	<0.001	0.0381
	8	382410	29122	1155442.40	2.52	1.13	1.11	1.15	<0.001	0.0092
	9	2159	145	5962.95	2.43	1.06	0.82	1.36	0.66	0.1279
	10	635288	32410	1834828.20	1.77	0.96	0.94	0.97	<0.001	0.0082
	Internal Reference Group	14173	961	39296.00	2.45	1.09	0.99	1.19	0.09	0.0488
Breakthrough infection within 3 months of vaccination (Total Count)	Control	2358651	139459	7265595.80	1.92	1.00 (Reference)	NA	NA	NA	NA

	1	9280	1674	27863.45	6.01	2.89	2.62	3.19	<0.001	0.0503
	2	39486	4223	107246.05	3.94	2.33	2.21	2.47	<0.001	0.0289
	3	89759	6359	255201.35	2.49	1.17	1.13	1.22	<0.001	0.0195
	4	477162	26079	1258294.97	2.07	1.22	1.2	1.24	<0.001	0.0096
	5	38926	2576	92553.88	2.78	1.53	1.43	1.63	<0.001	0.0329
	6	645309	50495	1966312.27	2.57	1.34	1.32	1.36	<0.001	0.0072
	7	24699	1725	74016.48	2.33	1.12	1.04	1.21	<0.001	0.0376
	8	382410	29803	1155442.40	2.58	1.14	1.12	1.16	<0.001	0.0091
	9	2159	148	5962.95	2.48	1.05	0.82	1.34	0.7	0.1263
	10	635288	33096	1834828.20	1.80	0.96	0.95	0.98	<0.001	0.0081
	Internal Reference Group	14173	996	39296.00	2.53	1.11	1.01	1.22	0.03	0.0482
Breakthrough infection between 4 and 6 months of vaccination (Binary)	Control	2358651	138672	7265595.80	1.91	1.00 (Reference)	NA	NA	NA	NA
	1	9280	1062	27863.45	3.81	1.94	1.74	2.15	<0.001	0.0542
	2	39486	3200	107246.05	2.98	1.71	1.61	1.82	<0.001	0.0303
	3	89759	5710	255201.35	2.24	1.07	1.03	1.12	<0.001	0.0202
	4	477162	27774	1258294.97	2.21	1.22	1.2	1.25	<0.001	0.0093
	5	38926	2500	92553.88	2.70	1.45	1.36	1.55	<0.001	0.0328
	6	645309	47002	1966312.27	2.39	1.26	1.24	1.28	<0.001	0.0074
	7	24699	1634	74016.48	2.21	1.22	1.13	1.31	<0.001	0.0386
	8	382410	27206	1155442.40	2.35	1.15	1.13	1.17	<0.001	0.0095
	9	2159	145	5962.95	2.43	1.34	1.04	1.73	0.02	0.1301
	10	635288	32291	1834828.20	1.76	0.93	0.92	0.95	<0.001	0.0082
	Internal Reference Group	14173	804	39296.00	2.05	0.98	0.89	1.09	0.71	0.052
Breakthrough infection between 4 and 6 months of vaccination (Total Count)	Control	2358651	141008	7265595.80	1.94	1.00 (Reference)	NA	NA	NA	NA
	1	9280	1111	27863.45	3.99	2	1.8	2.22	<0.001	0.0535
	2	39486	3312	107246.05	3.09	1.74	1.64	1.85	<0.001	0.0299

	3	89759	5875	255201.35	2.30	1.09	1.04	1.13	<0.001	0.0199
	4	477162	28449	1258294.97	2.26	1.23	1.21	1.25	<0.001	0.0092
	5	38926	2604	92553.88	2.81	1.49	1.4	1.59	<0.001	0.0324
	6	645309	48224	1966312.27	2.45	1.27	1.26	1.29	<0.001	0.0073
	7	24699	1666	74016.48	2.25	1.22	1.13	1.31	<0.001	0.0382
	8	382410	27695	1155442.40	2.40	1.15	1.13	1.17	<0.001	0.0094
	9	2159	149	5962.95	2.50	1.33	1.04	1.71	0.02	0.128
	10	635288	33004	1834828.20	1.80	0.94	0.92	0.95	<0.001	0.0081
	Internal Reference Group	14173	830	39296.00	2.11	1.01	0.91	1.11	0.89	0.0514
28-day CVD (Binary)	Control	2358651	829	7265595.80	0.01	1.00 (Reference)	NA	NA	NA	NA
	1	9280	14	27863.45	0.05	6.95	1.54	31.43	0.01	0.7697
	2	39486	32	107246.05	0.03	2.97	1.46	6.02	<0.001	0.3608
	3	89759	35	255201.35	0.01	2.28	1.2	4.33	0.01	0.327
	4	477162	292	1258294.97	0.02	1.38	1.14	1.67	<0.001	0.097
	5	38926	65	92553.88	0.07	8.98	4.74	17.01	<0.001	0.3257
	6	645309	399	1966312.27	0.02	1.67	1.4	1.99	<0.001	0.0893
	7	24699	12	74016.48	0.02	2.15	0.77	5.98	0.14	0.522
	8	382410	132	1155442.40	0.01	2.26	1.64	3.09	<0.001	0.1612
	9	2159	<5	-	-	-	-	-	-	-
	10	635288	508	1834828.20	0.03	2.89	2.42	3.45	<0.001	0.0904
	Internal Reference Group	14173	<5	-	-	-	-	-	-	-
28-day CVD (Total count)	Control	2358651	841	7265595.80	0.01	1.00 (Reference)	NA	NA	NA	NA
	1	9280	14	27863.45	0.05	6.95	1.54	31.43	0.01	0.7697
	2	39486	32	107246.05	0.03	2.97	1.46	6.02	<0.001	0.3608
	3	89759	35	255201.35	0.01	2.28	1.2	4.33	0.01	0.327
	4	477162	294	1258294.97	0.02	1.35	1.12	1.63	<0.001	0.0963

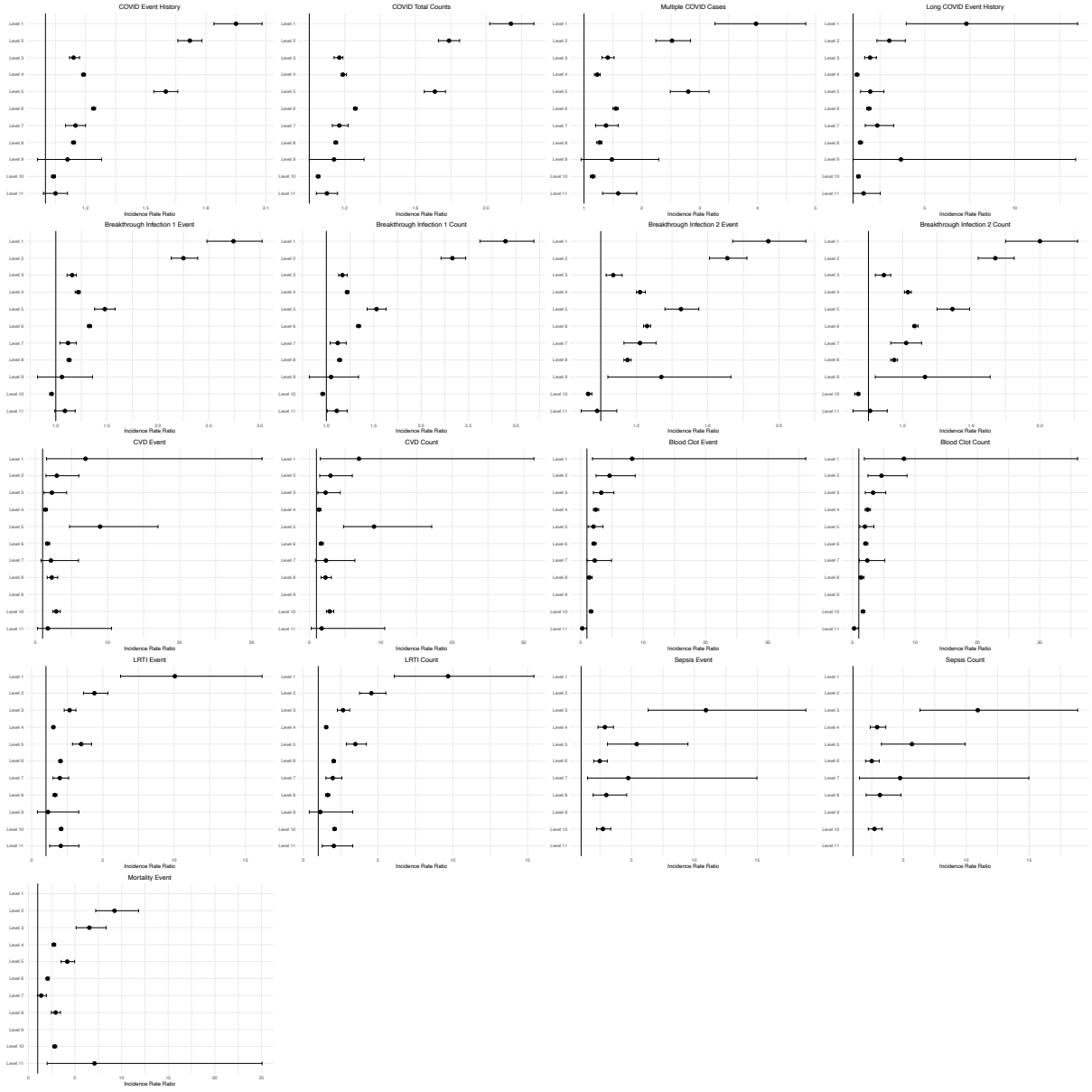
	5	38926	66	92553.88	0.07	9.06	4.79	17.13	<0.001	0.325
	6	645309	400	1966312.27	0.02	1.66	1.39	1.97	<0.001	0.089
	7	24699	13	74016.48	0.02	2.33	0.85	6.38	0.1	0.5134
	8	382410	132	1155442.40	0.01	2.26	1.64	3.09	<0.001	0.1612
	9	2159	<5	-	-	-	-	-	-	-
	10	635288	512	1834828.20	0.03	2.86	2.4	3.42	<0.001	0.0898
	Internal Reference Group	14173	<5	-	-	-	-	-	-	-
28-day Blood clot (Binary)	Control	2358651	981	7265595.80	0.01	1.00 (Reference)	NA	NA	NA	NA
	1	9280	17	27863.45	0.06	8.24	1.88	36.05	0.01	0.7528
	2	39486	52	107246.05	0.05	4.63	2.46	8.73	<0.001	0.3233
	3	89759	70	255201.35	0.03	3.29	2.03	5.32	<0.001	0.2452
	4	477162	413	1258294.97	0.03	2.42	2.03	2.89	<0.001	0.09
	5	38926	42	92553.88	0.05	2.05	1.17	3.58	0.01	0.2846
	6	645309	531	1966312.27	0.03	2.11	1.8	2.48	<0.001	0.081
	7	24699	23	74016.48	0.03	2.24	1.02	4.94	0.05	0.4034
	8	382410	129	1155442.40	0.01	1.39	1.04	1.85	0.03	0.148
	9	2159	<5	-	-	-	-	-	-	-
	10	635288	431	1834828.20	0.02	1.63	1.38	1.92	<0.001	0.084
	Internal Reference Group	14173	<5	-	-	-	-	-	-	-
28-day Blood clot (Total Count)	Control	2358651	990	7265595.80	0.01	1.00 (Reference)	NA	NA	NA	NA
	1	9280	17	27863.45	0.06	8.24	1.88	36.05	0.01	0.7528
	2	39486	52	107246.05	0.05	4.63	2.46	8.73	<0.001	0.3233
	3	89759	70	255201.35	0.03	3.29	2.03	5.32	<0.001	0.2452
	4	477162	416	1258294.97	0.03	2.41	2.02	2.87	<0.001	0.0896
	5	38926	42	92553.88	0.05	1.97	1.14	3.42	0.02	0.2806
	6	645309	538	1966312.27	0.03	2.09	1.79	2.45	<0.001	0.0802

	7	24699	24	74016.48	0.03	2.36	1.08	5.16	0.03	0.4001
	8	382410	130	1155442.40	0.01	1.37	1.03	1.83	0.03	0.1473
	9	2159	<5	-	-	-	-	-	-	-
	10	635288	438	1834828.20	0.02	1.66	1.41	1.96	<0.001	0.0837
	Internal Reference Group	14173	<5	-	-	-	-	-	-	-
28-day LRTI (Binary)	Control	2358651	8530	7265595.80	0.12	1.00 (Reference)	NA	NA	NA	NA
	1	9280	175	27863.45	0.63	10.05	6.24	16.17	<0.001	0.2429
	2	39486	557	107246.05	0.52	4.4	3.63	5.35	<0.001	0.0988
	3	89759	650	255201.35	0.25	2.66	2.28	3.1	<0.001	0.0782
	4	477162	2727	1258294.97	0.22	1.52	1.43	1.62	<0.001	0.0324
	5	38926	456	92553.88	0.49	3.47	2.86	4.2	<0.001	0.098
	6	645309	4419	1966312.27	0.22	2.02	1.91	2.13	<0.001	0.0278
	7	24699	178	74016.48	0.24	1.97	1.5	2.59	<0.001	0.1384
	8	382410	1604	1155442.40	0.14	1.63	1.5	1.77	<0.001	0.043
	9	2159	7	5962.95	0.12	1.14	0.4	3.3	0.8	0.5399
	10	635288	4180	1834828.20	0.23	2.07	1.96	2.18	<0.001	0.0283
	Internal Reference Group	14173	50	39296.00	0.13	2.04	1.26	3.31	<0.001	0.2468
28-day LRTI (Total Count)	Control	2358651	8601	7265595.80	0.12	1.00 (Reference)	NA	NA	NA	NA
	1	9280	179	27863.45	0.64	9.68	6.08	15.42	<0.001	0.2376
	2	39486	576	107246.05	0.54	4.55	3.76	5.52	<0.001	0.0983
	3	89759	657	255201.35	0.26	2.66	2.28	3.1	<0.001	0.0778
	4	477162	2769	1258294.97	0.22	1.53	1.44	1.63	<0.001	0.0322
	5	38926	461	92553.88	0.50	3.48	2.88	4.22	<0.001	0.0976
	6	645309	4483	1966312.27	0.23	2.03	1.92	2.14	<0.001	0.0277
	7	24699	180	74016.48	0.24	1.97	1.51	2.58	<0.001	0.1375
	8	382410	1621	1155442.40	0.14	1.63	1.49	1.77	<0.001	0.0428

	9	2159	7	5962.95	0.12	1.14	0.4	3.3	0.8	0.5399
	10	635288	4235	1834828.20	0.23	2.09	1.97	2.2	<0.001	0.0282
	Internal Reference Group	14173	50	39296.00	0.13	2.04	1.26	3.31	<0.001	0.2468
28-day Sepsis (Binary)	Control	2358651	568	7265595.80	0.01	1.00 (Reference)	NA	NA	NA	NA
	1	9280	30	27863.45	0.11	42.37	5.44	329.9	<0.001	1.0472
	2	39486	117	107246.05	0.11	45.26	20.71	98.91	<0.001	0.3988
	3	89759	99	255201.35	0.04	10.92	6.33	18.86	<0.001	0.2785
	4	477162	344	1258294.97	0.03	2.89	2.34	3.57	<0.001	0.1075
	5	38926	71	92553.88	0.08	5.42	3.09	9.49	<0.001	0.286
	6	645309	320	1966312.27	0.02	2.48	2	3.08	<0.001	0.1109
	7	24699	14	74016.48	0.02	4.75	1.51	14.98	0.01	0.5858
	8	382410	88	1155442.40	0.01	3	1.95	4.62	<0.001	0.2196
	9	2159	<5	-	-	-	-	-	-	-
	10	635288	362	1834828.20	0.02	2.73	2.23	3.35	<0.001	0.1035
	Internal Reference Group	14173	<5	-	-	-	-	-	-	-
28-day Sepsis (Total Count)	Control	2358651	571	7265595.80	0.01	1.00 (Reference)	NA	NA	NA	NA
	1	9280	31	27863.45	0.11	43.52	5.61	337.63	<0.001	1.0453
	2	39486	119	107246.05	0.11	45.76	20.97	99.85	<0.001	0.3981
	3	89759	99	255201.35	0.04	10.92	6.33	18.86	<0.001	0.2785
	4	477162	347	1258294.97	0.03	2.92	2.37	3.61	<0.001	0.1073
	5	38926	74	92553.88	0.08	5.69	3.26	9.92	<0.001	0.2841
	6	645309	322	1966312.27	0.02	2.49	2	3.09	<0.001	0.1105
	7	24699	14	74016.48	0.02	4.75	1.51	14.98	0.01	0.5858
	8	382410	91	1155442.40	0.01	3.14	2.04	4.82	<0.001	0.2188
	9	2159	<5	-	-	-	-	-	-	-
	10	635288	364	1834828.20	0.02	2.71	2.21	3.32	<0.001	0.103

	Internal Reference Group	14173	<5	-	-	-	-	-	-	-
Long COVID	Control	2358651	6084	7265595.80	0.08	1.00 (Reference)	NA	NA	NA	NA
	1	9280	80	27863.45	0.29	7.31	3.96	13.5	<0.001	0.313
	2	39486	238	107246.05	0.22	3.02	2.33	3.91	<0.001	0.1317
	3	89759	441	255201.35	0.17	1.95	1.65	2.3	<0.001	0.0858
	4	477162	1200	1258294.97	0.10	1.22	1.12	1.33	<0.001	0.0447
	5	38926	106	92553.88	0.11	1.96	1.42	2.72	<0.001	0.1665
	6	645309	3028	1966312.27	0.15	1.88	1.76	2	<0.001	0.0324
	7	24699	121	74016.48	0.16	2.35	1.68	3.27	<0.001	0.17
	8	382410	1518	1155442.40	0.13	1.41	1.3	1.53	<0.001	0.0426
	9	2159	12	5962.95	0.20	3.67	1.01	13.39	0.05	0.6602
	10	635288	1985	1834828.20	0.11	1.3	1.21	1.4	<0.001	0.0355
	Internal Reference Group	14173	48	39296.00	0.12	1.59	1.01	2.52	0.05	0.2336
Mortality	Control	2358651	5642	7265595.80	0.08	1.00 (Reference)	NA	NA	NA	NA
	1	9280	92	27863.45	0.33	47.12	20.1	110.49	<0.001	0.4348
	2	39486	396	107246.05	0.37	9.24	7.22	11.82	<0.001	0.1257
	3	89759	331	255201.35	0.13	6.54	5.12	8.34	<0.001	0.1247
	4	477162	2991	1258294.97	0.24	2.73	2.55	2.93	<0.001	0.0357
	5	38926	572	92553.88	0.62	4.17	3.51	4.96	<0.001	0.088
	6	645309	2151	1966312.27	0.11	2.07	1.91	2.24	<0.001	0.0409
	7	24699	106	74016.48	0.14	1.37	0.97	1.93	0.07	0.1762
	8	382410	536	1155442.40	0.05	2.92	2.47	3.44	<0.001	0.0844
	9	2159	5	5962.95	0.08	14.68	1.32	162.95	0.03	1.2279
	10	635288	2572	1834828.20	0.14	2.82	2.61	3.04	<0.001	0.0386
	Internal Reference Group	14173	13	39296.00	0.03	7.09	2.01	25.06	<0.001	0.6443

Summary Forest Plot of Age-Sex Matched & Unadjusted IRRs of Outcomes of Interest by IS + IRG subgroup



Appendix 25: Subgroup Analysis of Age-Sex Matched & Fully Adjusted Outcomes of Interest by Study Year

Subgroup Analysis of Age-Sex Matched & Fully Adjusted Cohort by Study Year, 2020

Outcome of Interest	Phenotype Level	Sample Size	Events	Person years	Incidence Rate per 100 person years	Incidence Rate Ratio	LCI	UCI	*p-value*	Non-Robust SE
COVID-19 infection (Binary)	Control	1691217	35228	1589919.08	2.22	1.00 (Reference)	NA	NA	NA	NA
	1	7280	219	6818.84	3.21	1.29	1.04	1.6	0.02	0.1086
	2	28074	667	25199.88	2.65	1.48	1.31	1.68	<0.001	0.0637
	3	63277	1930	58033.79	3.33	1.23	1.15	1.32	<0.001	0.0365
	4	329578	6923	293141.29	2.36	1.23	1.18	1.29	<0.001	0.019
	5	27424	894	23705.68	3.77	1.64	1.47	1.84	<0.001	0.0586
	6	482689	13798	451895.12	3.05	1.34	1.31	1.38	<0.001	0.014
	7	18955	557	17484.88	3.19	1.25	1.1	1.43	<0.001	0.0676
	8	276883	9013	259226.11	3.48	1.28	1.24	1.32	<0.001	0.017
	9	1341	39	1226.19	3.18	2.17	1.23	3.81	0.01	0.2882
	10	446312	13555	413422.59	3.28	1.39	1.35	1.43	<0.001	0.015
	Internal Reference Group	9404	234	8577.49	2.73	1.09	0.9	1.32	0.36	0.0967
COVID-19 infection (Total Count)	Control	1691217	35655	1589919.08	2.24	1.00 (Reference)	NA	NA	NA	NA
	1	7280	223	6818.84	3.27	1.29	1.05	1.6	0.02	0.1078
	2	28074	686	25199.88	2.72	1.49	1.32	1.69	<0.001	0.0629
	3	63277	1956	58033.79	3.37	1.23	1.15	1.33	<0.001	0.0363

	4	329578	7050	293141.29	2.40	1.23	1.19	1.28	<0.001	0.0188
	5	27424	926	23705.68	3.91	1.67	1.49	1.87	<0.001	0.0579
	6	482689	13971	451895.12	3.09	1.34	1.31	1.38	<0.001	0.0139
	7	18955	566	17484.88	3.24	1.26	1.1	1.44	<0.001	0.0672
	8	276883	9116	259226.11	3.52	1.28	1.24	1.32	<0.001	0.017
	9	1341	40	1226.19	3.26	2.24	1.28	3.93	<0.00	0.2866
	10	446312	13780	413422.59	3.33	1.39	1.35	1.43	<0.001	0.0149
	Internal Reference Group	9404	238	8577.49	2.77	1.11	0.92	1.34	0.28	0.0963
Multiple COVID-19 cases	Control	1691217	409	1589919.08	0.03	1.00 (Reference)	NA	NA	NA	NA
	1	7280	<5	-	-	-	-	-	-	-
	2	28074	16	25199.88	0.06	1.53	0.65	3.58	0.33	0.4341
	3	63277	26	58033.79	0.04	1.73	0.79	3.78	0.17	0.399
	4	329578	118	293141.29	0.04	1.49	1.09	2.04	0.01	0.1599
	5	27424	30	23705.68	0.13	4.12	1.74	9.78	<0.001	0.4409
	6	482689	163	451895.12	0.04	1.39	1.06	1.83	0.02	0.1405
	7	18955	7	17484.88	0.04	2.7	0.53	13.71	0.23	0.8294
	8	276883	98	259226.11	0.04	1.57	1.08	2.27	0.02	0.1896
	9	1341	<5	-	-	-	-	-	-	-
	10	446312	204	413422.59	0.05	1.56	1.2	2.04	<0.001	0.136
	Internal Reference Group	9404	<5	-	-	-	-	-	-	-
28-day CVD (Binary)	Control	1691217	96	1589919.08	0.01	1.00 (Reference)	NA	NA	NA	NA

	1	7280	<5	-	-	-	-	-	-	-
	2	28074	<5	-	-	-	-	-	-	-
	3	63277	<5	-	-	-	-	-	-	-
	4	329578	30	293141.29	0.01	1.28	0.64	2.58	0.48	0.3566
	5	27424	12	23705.68	0.05	4.36	0.68	27.24	0.12	0.9444
	6	482689	40	451895.12	0.01	1.98	1.03	3.8	0.04	0.3333
	7	18955	<5	-	-	-	-	-	-	-
	8	276883	13	259226.11	0.01	3.79	0.93	15.4	0.06	0.7151
	9	1341	<5	-	-	-	-	-	-	-
	10	446312	58	413422.59	0.01	1.91	1.06	3.43	0.03	0.2993
	Internal Reference Group	9404	<5	-	-	-	-	-	-	-
28-day CVD (Total count)	Control	1691217	97	1589919.08	0.01	1.00 (Reference)	NA	NA	NA	NA
	1	7280	<5	-	-	-	-	-	-	-
	2	28074	<5	-	-	-	-	-	-	-
	3	63277	<5	-	-	-	-	-	-	-
	4	329578	30	293141.29	0.01	1.28	0.64	2.57	0.49	0.3567
	5	27424	12	23705.68	0.05	4.4	0.69	27.98	0.12	0.9442
	6	482689	40	451895.12	0.01	1.95	1.02	3.74	0.04	0.3322
	7	18955	<5	-	-	-	-	-	-	-
	8	276883	13	259226.11	0.01	3.7	0.92	14.97	0.07	0.7128
	9	1341	<5	-	-	-	-	-	-	-
	10	446312	59	413422.59	0.01	1.95	1.09	3.49	0.02	0.2968

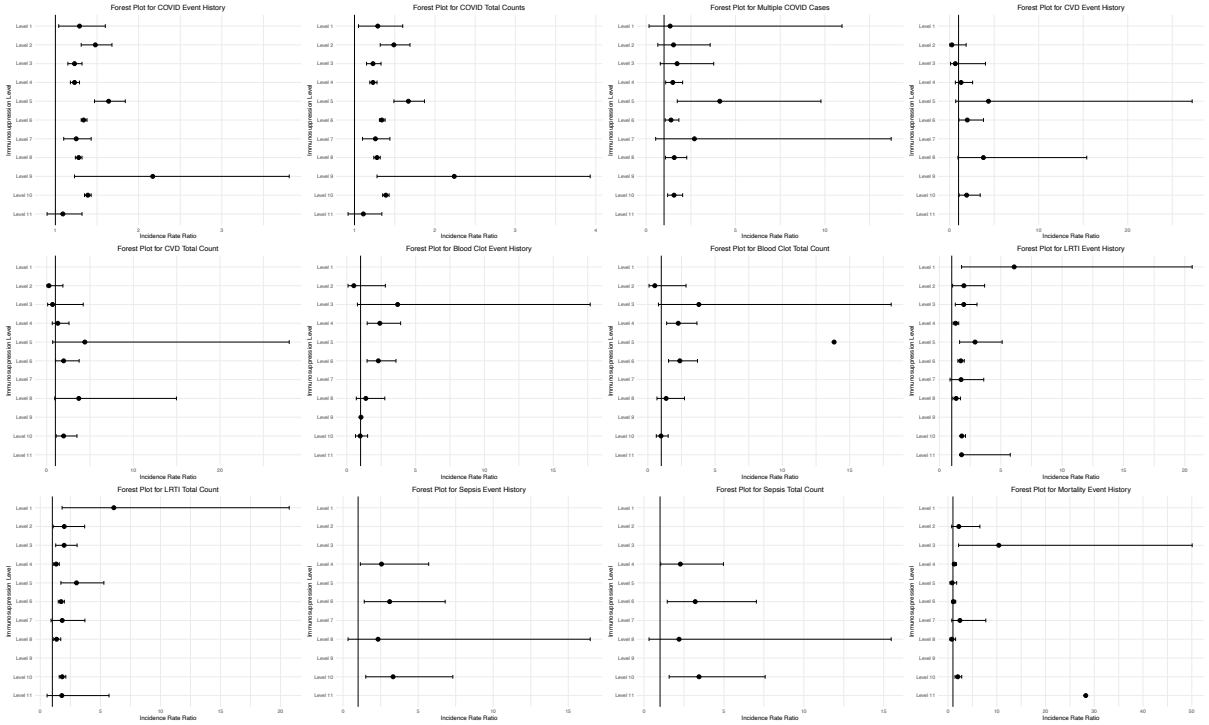
	Internal Reference Group	9404	<5	-	-	-	-	-	-	-
28-day Blood clot (Binary)	Control	1691217	149	1589919.08	0.01	1.00 (Reference)	NA	NA	NA	NA
	1	7280	<5	-	-	-	-	-	-	-
	2	28074	<5	-	-	-	-	-	-	-
	3	63277	13	58033.79	0.02	3.69	0.77	17.68	0.1	0.7991
	4	329578	71	293141.29	0.02	2.4	1.48	3.91	<0.001	0.2483
	5	27424	8	23705.68	0.03	14.04	1.05	187.37	0.05	1.3221
	6	482689	94	451895.12	0.02	2.29	1.47	3.57	<0.001	0.2268
	7	18955	<5	-	-	-	-	-	-	-
	8	276883	29	259226.11	0.01	1.38	0.69	2.76	0.36	0.3538
	9	1341	<5	-	-	-	-	-	-	-
	10	446312	84	413422.59	0.02	0.97	0.63	1.51	0.9	0.2237
	Internal Reference Group	9404	<5	-	-	-	-	-	-	-
28-day Blood clot (Total Count)	Control	1691217	152	1589919.08	0.01	1.00 (Reference)	NA	NA	NA	NA
	1	7280	<5	-	-	-	-	-	-	-
	2	28074	<5	-	-	-	-	-	-	-
	3	63277	13	58033.79	0.02	3.79	0.79	18.08	0.09	0.797
	4	329578	71	293141.29	0.02	2.26	1.4	3.65	<0.001	0.244
	5	27424	8	23705.68	0.03	13.84	1.05	182.96	0.05	1.3173
	6	482689	96	451895.12	0.02	2.38	1.54	3.69	<0.001	0.2237
	7	18955	<5	-	-	-	-	-	-	-

	8	276883	29	259226.11	0.01	1.36	0.68	2.72	0.38	0.3526
	9	1341	<5	-	-	-	-	-	-	-
	10	446312	85	413422.59	0.02	0.98	0.63	1.51	0.91	0.2227
	Internal Reference Group	9404	<5	-	-	-	-	-	-	-
28-day LRTI (Binary)	Control	1691217	1247	1589919.08	0.08	1.00 (Reference)	NA	NA	NA	NA
	1	7280	15	6818.84	0.22	6.09	1.8	20.6	<0.001	0.622
	2	28074	41	25199.88	0.16	1.99	1.07	3.68	0.03	0.3144
	3	63277	85	58033.79	0.15	1.98	1.29	3.06	<0.001	0.2215
	4	329578	391	293141.29	0.13	1.32	1.11	1.57	<0.001	0.0892
	5	27424	65	23705.68	0.27	2.9	1.64	5.11	<0.001	0.2894
	6	482689	643	451895.12	0.14	1.74	1.5	2.02	<0.001	0.0749
	7	18955	25	17484.88	0.14	1.76	0.86	3.61	0.12	0.3672
	8	276883	247	259226.11	0.10	1.36	1.09	1.71	0.01	0.1148
	9	1341	<5	-	-	-	-	-	-	-
	10	446312	762	413422.59	0.18	1.82	1.82	2.12	<0.001	0.0767
	Internal Reference Group	9404	7	8577.49	0.08	1.8	1.8	5.77	0.32	0.5937
28-day LRTI (Total Count)	Control	1691217	1255	1589919.08	0.08	1.00 (Reference)	NA	NA	NA	NA
	1	7280	15	6818.84	0.22	6.12	1.81	20.72	<0.001	0.6223
	2	28074	41	25199.88	0.16	1.99	1.07	3.69	0.03	0.3147
	3	63277	85	58033.79	0.15	1.98	1.28	3.06	<0.001	0.2218
	4	329578	392	293141.29	0.13	1.32	1.11	1.58	<0.001	0.0892

	5	27424	66	23705.68	0.28	3.01	1.71	5.29	<0.001	0.2886
	6	482689	648	451895.12	0.14	1.73	1.49	2	<0.001	0.0745
	7	18955	26	17484.88	0.15	1.82	0.89	3.71	0.1	0.3642
	8	276883	247	259226.11	0.10	1.35	1.08	1.7	0.01	0.1146
	9	1341	<5	-	-	-	-	-	-	-
	10	446312	767	413422.59	0.19	1.82	1.57	2.12	<0.001	0.0765
	Internal Reference Group	9404	7	8577.49	0.08	1.79	0.56	5.72	0.33	0.5939
28-day Sepsis (Binary)	Control	1691217	65	1589919.08	0.00	1.00 (Reference)	NA	NA	NA	NA
	1	7280	5	6818.84	0.07	6.6989E+11	0	Inf	0.97	693.0254
	2	28074	8	25199.88	0.03	12.45	1.17	132.86	0.04	1.2079
	3	63277	10	58033.79	0.02	1045051.78	0	2.24E+23	0.96	267.0662
	4	329578	42	293141.29	0.01	2.56	1.15	5.7	0.02	0.4088
	5	27424	9	23705.68	0.04	1846805.47	0	Inf	0.97	424.2483
	6	482689	44	451895.12	0.01	3.1	1.41	6.8	<0.001	0.4012
	7	18955	<5	-	-	-	-	-	-	-
	8	276883	12	259226.11	0.00	2.33	0.33	16.46	0.4	0.9977
	9	1341	<5	-	-	-	-	-	-	-
	10	446312	58	413422.59	0.01	3.33	1.51	7.31	<0.001	0.4018
	Internal Reference Group	9404	<5	-	-	-	-	-	-	-
28-day Sepsis (Total Count)	Control	1691217	66	1589919.08	0.00	1.00 (Reference)	NA	NA	NA	NA
	1	7280	5	6818.84	0.07	7.8602E+11	NA	NA	0.97	688.7193

	2	28074	9	25199.88	0.04	16.51	1.6	170.71	0.02	1.1917
	3	63277	10	58033.79	0.02	1093382.48	0	3.49E+228	0.96	261.3956
	4	329578	42	293141.29	0.01	2.27	1.04	4.97	0.04	0.399
	5	27424	9	23705.68	0.04	2034089.32	0	Inf	0.97	418.9713
	6	482689	44	451895.12	0.01	3.2	1.45	7.03	<0.001	0.4021
	7	18955	<5	-	-	-	-	-	-	-
	8	276883	12	259226.11	0.00	2.19	0.31	15.47	0.43	0.998
	9	1341	<5	-	-	-	-	-	-	-
	10	446312	58	413422.59	0.01	3.44	1.57	7.58	<0.001	0.4023
	Internal Reference Group	9404	<5	-	-	-	-	-	-	-
Mortality	Control	1691217	1498	1589919.08	0.09	1.00 (Reference)	NA	NA	NA	NA
	1	7280	22	6818.84	0.32	46535.3	0	5.26E+72	0.89	79.9482
	2	28074	74	25199.88	0.29	2.2	0.74	6.53	0.15	0.5544
	3	63277	85	58033.79	0.15	10.41	2.16	50.08	<0.001	0.8015
	4	329578	652	293141.29	0.22	1.27	0.94	1.73	0.12	0.1559
	5	27424	154	23705.68	0.65	0.84	0.4	1.76	0.64	0.3801
	6	482689	539	451895.12	0.12	1.1	0.77	1.57	0.61	0.1823
	7	18955	33	17484.88	0.19	2.43	0.76	7.74	0.13	0.5905
	8	276883	158	259226.11	0.06	0.79	0.4	1.54	0.49	0.341
	9	1341	<5	-	-	-	-	-	-	-
	10	446312	735	413422.59	0.18	1.99	1.42	2.8	<0.001	0.1737
	Internal Reference Group	9404	<5	-	-	-	-	-	-	-

Summary Forest Plot of Subgroup Analysis of Age-Sex Matched & Fully Adjusted Cohort by Study Year, 2020



Subgroup Analysis of Age-Sex Matched & Fully Adjusted Cohort by Study Year, 2021

Outcome of Interest	Phenotype Level	Sample Size	Events	Person years	Incidence Rate per 100 person years	Incidence Rate Ratio	LCI	UCI	*p-value*	Non-Robust SE
COVID-19 infection (Binary)	Control	1775965	132622	1632119.43	8.13	1.00 (Reference)	NA	NA	NA	NA
	1	7348	878	6785.62	12.94	1.24	1.12	1.38	<0.001	0.0531
	2	28907	2097	25742.61	8.15	1.21	1.14	1.3	<0.001	0.0338
	3	66312	6553	60125.29	10.90	1.08	1.04	1.12	<0.001	0.0186
	4	340496	20879	299852.77	6.96	1.14	1.11	1.16	<0.001	0.0105
	5	26361	1901	22558.16	8.43	1.29	1.2	1.38	<0.001	0.0363
	6	506634	48735	467887.43	10.42	1.22	1.21	1.24	<0.001	0.0072
	7	19400	1758	17861.76	9.84	1.11	1.04	1.2	<0.001	0.0365
	8	295770	36166	271873.37	13.30	1.19	1.17	1.21	<0.001	0.0082
	9	1526	172	1363.70	12.61	1.33	1.05	1.69	0.02	0.1216
	10	472998	37365	430268.76	8.68	1.14	1.12	1.16	<0.001	0.0082
	Internal Reference Group	10213	1013	9160.42	11.06	1.01	0.92	1.1	0.85	0.0455
COVID-19 infection (Total Count)	Control	1775965	134744	1632119.43	8.26	1.00 (Reference)	NA	NA	NA	NA
		7348	916	6785.62	13.50	1.27	1.14	1.41	<0.001	0.0523
	2	28907	2153	25742.61	8.36	1.23	1.15	1.31	<0.001	0.0335
	3	66312	6682	60125.29	11.11	1.09	1.05	1.13	<0.001	0.0184
	4	340496	21166	299852.77	7.06	1.13	1.11	1.16	<0.001	0.0105
	5	26361	1941	22558.16	8.60	1.29	1.2	1.38	<0.001	0.0359

	6	506634	49578	467887.43	10.60	1.22	1.21	1.24	<0.001	0.0071
	7	19400	1797	17861.76	10.06	1.12	1.05	1.21	<0.001	0.0362
	8	295770	36911	271873.37	13.58	1.19	1.17	1.21	<0.001	0.0082
	9	1526	176	1363.70	12.91	1.33	1.05	1.68	0.02	0.1202
	10	472998	37957	430268.76	8.82	1.14	1.12	1.16	<0.001	0.0081
	Internal Reference Group	10213	1042	9160.42	11.38	1.02	0.93	1.11	0.73	0.045
Multiple COVID-19 cases	Control	1775965	2079	1632119.43	0.13	1.00 (Reference)	NA	NA	NA	NA
	1	7348	35	6785.62	0.52	2.67	1.39	5.12	<0.001	0.3328
	2	28907	50	25742.61	0.19	2.22	1.33	3.71	<0.001	0.2611
	3	66312	128	60125.29	0.21	1.4	1.06	1.86	0.02	0.1446
	4	340496	283	299852.77	0.09	1.02	0.85	1.21	0.85	0.0889
	5	26361	37	22558.16	0.16	1.43	0.84	2.45	0.19	0.2724
	6	506634	819	467887.43	0.18	1.35	1.21	1.51	<0.001	0.0579
	7	19400	37	17861.76	0.21	1.51	0.88	2.59	0.13	0.2751
	8	295770	737	271873.37	0.27	1.27	1.12	1.42	<0.001	0.0604
	9	1526	<5	-	-	-	-	-	-	-
	10	472998	564	430268.76	0.13	1.14	1	1.3	0.06	0.0679
	11	10213	28	9160.42	0.31	1.56	0.82	2.95	0.17	0.3251
Breakthrough infection within 3 months of vaccination(Binary)	0	1775965	39590	1632119.43	2.43	1.00 (Reference)	NA	NA	NA	NA
	1	7348	385	6785.62	5.67	1.69	1.4	2.04	<0.001	0.0962
	2	28907	788	25742.61	3.06	1.35	1.2	1.52	<0.001	0.0603
	3	66312	1827	60125.29	3.04	1.03	0.96	1.11	0.42	0.0378

	4	340496	6717	299852.77	2.24	1.1	1.06	1.14	<0.001	0.0192
	5	26361	566	22558.16	2.51	1.19	1.04	1.36	0.01	0.0692
	6	506634	14769	467887.43	3.16	1.17	1.14	1.2	<0.001	0.0138
	7	19400	522	17861.76	2.92	1.12	0.98	1.29	0.11	0.0712
	8	295770	10175	271873.37	3.74	1.11	1.08	1.15	<0.001	0.0169
	9	1526	48	1363.70	3.52	1.36	0.8	2.32	0.25	0.2713
	10	472998	10267	430268.76	2.39	1.03	1	1.07	0.04	0.0161
	Internal Reference Group	10213	343	9160.42	3.74	1.26	1.05	1.5	0.01	0.0909
Breakthrough infection within 3 months of vaccination (Total Count)	Control	1775965	39771	1632119.43	2.44	1.00 (Reference)	NA	NA	NA	NA
	1	7348	391	6785.62	5.76	1.73	1.43	2.08	<0.001	0.0958
	2	28907	793	25742.61	3.08	1.35	1.2	1.52	<0.001	0.0601
	3	66312	1836	60125.29	3.05	1.03	0.96	1.11	0.39	0.0377
	4	340496	6737	299852.77	2.25	1.09	1.05	1.14	<0.001	0.0192
	5	26361	574	22558.16	2.54	1.19	1.04	1.37	0.01	0.0688
	6	506634	14869	467887.43	3.18	1.17	1.14	1.21	<0.001	0.0138
	7	19400	524	17861.76	2.93	1.12	0.97	1.29	0.12	0.071
	8	295770	10223	271873.37	3.76	1.11	1.08	1.15	<0.001	0.0168
	9	1526	48	1363.70	3.52	1.31	0.77	2.21	0.32	0.2681
	10	472998	10332	430268.76	2.40	1.04	1	1.07	0.03	0.0161
	Internal Reference Group	10213	345	9160.42	3.77	1.25	1.05	1.5	0.01	0.0906
Breakthrough infection between 4 and 6 months of vaccination (Binary)	Control	1775965	49369	1632119.43	3.02	1.00 (Reference)	NA	NA	NA	NA

	1	7348	247	6785.62	3.64	0.96	0.79	1.17	0.7	0.1001
	2	28907	606	25742.61	2.35	0.92	0.81	1.04	0.17	0.0626
	3	66312	1957	60125.29	3.25	0.91	0.85	0.98	0.01	0.0352
	4	340496	6943	299852.77	2.32	0.97	0.94	1.01	0.15	0.0184
	5	26361	479	22558.16	2.12	0.91	0.8	1.05	0.2	0.07
	6	506634	17138	467887.43	3.66	1.05	1.03	1.08	<0.001	0.0126
	7	19400	556	17861.76	3.11	0.93	0.82	1.07	0.31	0.0671
	8	295770	12142	271873.37	4.47	1.04	1.01	1.08	<0.001	0.0152
	9	1526	55	1363.70	4.03	1.13	0.72	1.78	0.6	0.232
	10	472998	11000	430268.76	2.56	0.91	0.88	0.94	<0.001	0.015
	Internal Reference Group	10213	250	9160.42	2.73	0.72	0.61	0.87	<0.001	0.0915
Breakthrough infection between 4 and 6 months of vaccination (Total Count)	Control	1775965	49491	1632119.43	3.03	1.00 (Reference)	NA	NA	NA	NA
	1	7348	249	6785.62	3.67	0.96	0.79	1.17	0.69	0.0999
	2	28907	611	25742.61	2.37	0.92	0.82	1.04	0.2	0.0625
	3	66312	1965	60125.29	3.27	0.91	0.85	0.98	0.01	0.0352
	4	340496	6969	299852.77	2.32	0.97	0.94	1.01	0.15	0.0184
	5	26361	481	22558.16	2.13	0.92	0.8	1.05	0.21	0.0699
	6	506634	17195	467887.43	3.68	1.05	1.03	1.08	<0.001	0.0126
	7	19400	557	17861.76	3.12	0.94	0.82	1.07	0.33	0.067
	8	295770	12175	271873.37	4.48	1.05	1.01	1.08	<0.001	0.0152
	9	1526	56	1363.70	4.11	1.15	0.73	1.81	0.54	0.2307
	10	472998	11046	430268.76	2.57	0.91	0.88	0.94	<0.001	0.015

	Internal Reference Group	10213	251	9160.42	2.74	0.72	0.6	0.86	<0.001	0.0915
28-day CVD (Binary)	Control	1775965	132	1632119.43	0.01	1.00 (Reference)	NA	NA	NA	NA
	1	7348	<5	-	-	-	-	-	-	-
	2	28907	<5	-	-	-	-	-	-	-
	3	66312	<5	-	-	-	-	-	-	-
	4	340496	40	299852.77	0.01	1.71	0.96	3.05	0.07	0.2946
	5	26361	9	22558.16	0.04	6.99	1.52	32.16	0.01	0.7789
	6	506634	63	467887.43	0.01	1.78	1.12	2.85	0.02	0.2389
	7	19400	<5	-	-	-	-	-	-	-
	8	295770	22	271873.37	0.01	1.28	0.58	2.83	0.54	0.404
	9	1526	<5	-	-	-	-	-	-	-
	10	472998	85	430268.76	0.02	2.14	1.34	3.41	<0.001	0.2393
	Internal Reference Group	10213	<5	-	-	-	-	-	-	-
28-day CVD (Total count)	Control	1775965	133	1632119.43	0.01	1.00 (Reference)	NA	NA	NA	NA
	1	7348	<5	-	-	-	-	-	-	-
	2	28907	5	25742.61	0.02	2.6	0.43	15.81	0.3	0.9213
	3	66312	5	60125.29	0.01	3.08	0.3	31.78	0.34	1.1909
	4	340496	40	299852.77	0.01	1.7	0.95	3.02	0.07	0.294
	5	26361	9	22558.16	0.04	6.85	1.49	31.37	0.01	0.7766
	6	506634	64	467887.43	0.01	1.8	1.13	2.87	0.01	0.2381
	7	19400	<5	-	-	-	-	-	-	-
	8	295770	22	271873.37	0.01	1.15	0.53	2.48	0.73	0.3941

	9	1526	0	1363.70	0.00	1.09	0	Inf	1	11132.1486
	10	472998	85	430268.76	0.02	2.13	1.33	3.4	<0.001	0.2392
	Internal Reference Group	10213	<5	-	-	-	-	-	-	-
28-day Blood clot (Binary)	Control	1775965	308	1632119.43	0.02	1.00 (Reference)	NA	NA	NA	NA
	1	7348	5	6785.62	0.07	1.74	0.18	16.4	0.63	1.1441
	2	28907	20	25742.61	0.08	28.88	3.54	235.91	<0.001	1.0715
	3	66312	16	60125.29	0.03	1.53	0.63	3.72	0.35	0.453
	4	340496	102	299852.77	0.03	2.06	1.45	2.95	<0.001	0.182
	5	26361	8	22558.16	0.04	0.95	0.28	3.2	0.93	0.6221
	6	506634	150	467887.43	0.03	1.97	1.44	2.68	<0.001	0.1591
	7	19400	6	17861.76	0.03	0.87	0.24	3.19	0.84	0.6606
	8	295770	39	271873.37	0.01	0.81	0.49	1.32	0.4	0.251
	9	1526	<5	-	-	-	-	-	-	-
	10	472998	132	430268.76	0.03	1.09	0.8	1.49	0.59	0.1604
	Internal Reference Group	10213	<5	-	-	-	-	-	-	-
28-day Blood clot (Total Count)	Control	1775965	313	1632119.43	0.02	1.00 (Reference)	NA	NA	NA	NA
	1	7348	5	6785.62	0.07	1.74	0.18	16.35	0.63	1.1438
	2	28907	20	25742.61	0.08	28.89	3.54	235.63	<0.001	1.0708
	3	66312	16	60125.29	0.03	1.53	0.63	3.72	0.35	0.4525
	4	340496	103	299852.77	0.03	2	1.41	2.84	<0.001	0.1794
	5	26361	8	22558.16	0.04	0.96	0.28	3.24	0.94	0.6222
	6	506634	152	467887.43	0.03	1.94	1.42	2.64	<0.001	0.1577

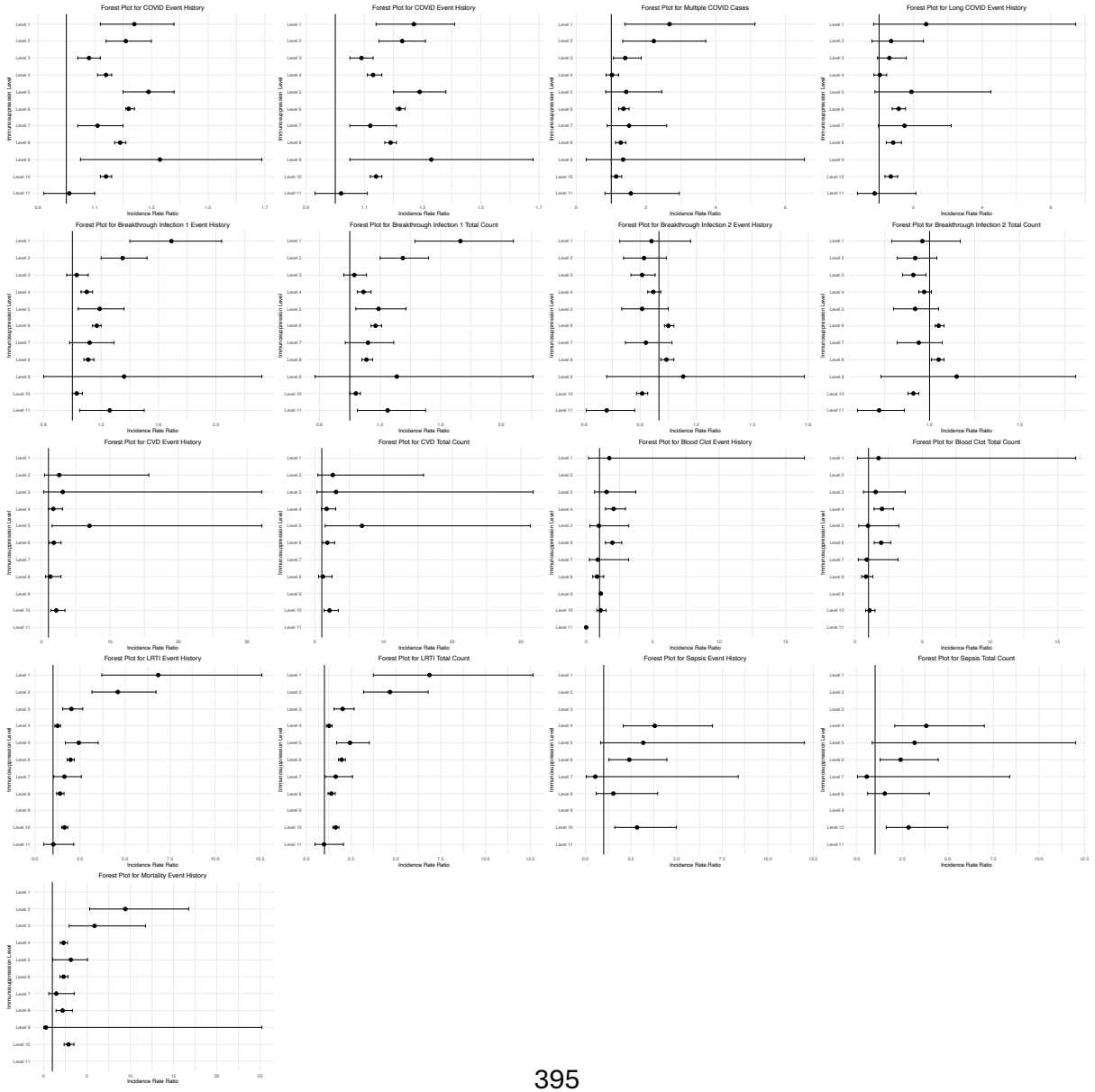
	7	19400	6	17861.76	0.03	0.87	0.24	3.19	0.84	0.6604
	8	295770	39	271873.37	0.01	0.81	0.49	1.32	0.4	0.2507
	9	1526	<5	-	-	-	-	-	-	-
	10	472998	132	430268.76	0.03	1.08	0.79	1.48	0.61	0.1597
	Internal Reference Group	10213	<5	-	-	-	-	-	-	-
28-day LRTI (Binary)	Control	1775965	2653	1632119.43	0.16	1.00 (Reference)	NA	NA	NA	NA
	1	7348	74	6785.62	1.09	6.84	3.71	12.6	<0.001	0.312
	2	28907	150	25742.61	0.58	4.6	3.16	6.72	<0.001	0.1927
	3	66312	190	60125.29	0.32	2.02	1.54	2.65	<0.001	0.1396
	4	340496	690	299852.77	0.23	1.25	1.1	1.42	<0.001	0.0646
	5	26361	117	22558.16	0.52	2.43	1.68	3.51	<0.001	0.1872
	6	506634	1459	467887.43	0.31	1.97	1.78	2.18	<0.001	0.0511
	7	19400	64	17861.76	0.36	1.63	1.04	2.57	0.03	0.231
	8	295770	579	271873.37	0.21	1.39	1.2	1.61	<0.001	0.0739
	9	1526	<5	-	-	-	-	-	-	-
	10	472998	1399	430268.76	0.33	1.64	1.48	1.82	<0.001	0.053
	Internal Reference Group	10213	16	9160.42	0.17	1.02	0.48	2.15	0.96	0.3818
28-day LRTI (Total Count)	Control	1775965	2665	1632119.43	0.16	1.00 (Reference)	NA	NA	NA	NA
	1	7348	75	6785.62	1.11	6.87	3.73	12.66	<0.001	0.3118
	2	28907	152	25742.61	0.59	4.66	3.19	6.79	<0.001	0.1924
	3	66312	190	60125.29	0.32	2.02	1.54	2.66	<0.001	0.1396
	4	340496	691	299852.77	0.23	1.26	1.11	1.43	<0.001	0.0646

	5	26361	117	22558.16	0.52	2.43	1.68	3.51	<0.001	0.1873
	6	506634	1464	467887.43	0.31	1.96	1.78	2.17	<0.001	0.051
	7	19400	64	17861.76	0.36	1.63	1.04	2.57	0.03	0.2311
	8	295770	580	271873.37	0.21	1.39	1.2	1.6	<0.001	0.0739
	9	1526	<5	-	-	-	-	-	-	-
	10	472998	1404	430268.76	0.33	1.63	1.47	1.81	<0.001	0.0529
	Internal Reference Group	10213	16	9160.42	0.17	0.98	0.47	2.06	0.96	0.3774
28-day Sepsis (Binary)	Control	1775965	91	1632119.43	0.01	1.00 (Reference)	NA	NA	NA	NA
	1	7348	<5	-	-	-	-	-	-	-
	2	28907	28	25742.61	0.11	163.71	12.31	2177.26	<0.001	1.3203
	3	66312	18	60125.29	0.03	11.63	1.67	81.02	0.01	0.9905
	4	340496	56	299852.77	0.02	3.8	2.07	6.97	<0.001	0.3095
	5	26361	15	22558.16	0.07	3.17	0.84	12.01	0.09	0.679
	6	506634	53	467887.43	0.01	2.4	1.29	4.47	0.01	0.3178
	7	19400	<5	-	-	-	-	-	-	-
	8	295770	19	271873.37	0.01	1.53	0.59	3.96	0.38	0.4854
	9	1526	<5	-	-	-	-	-	-	-
	10	472998	77	430268.76	0.02	2.83	1.61	4.99	<0.001	0.2894
	Internal Reference Group	10213	<5	-	-	-	-	-	-	-
28-day Sepsis (Total Count)	Control	1775965	91	1632119.43	0.01	1.00 (Reference)	NA	NA	NA	NA
	1	7348	<5	-	-	-	-	-	-	-
	2	28907	28	25742.61	0.11	165.55	12.43	2204.25	<0.001	1.3209

	3	66312	18	60125.29	0.03	11.4	1.67	77.8	0.01	0.98
	4	340496	56	299852.77	0.02	3.81	2.08	7	<0.001	0.3097
	5	26361	15	22558.16	0.07	3.17	0.84	12.02	0.09	0.6801
	6	506634	53	467887.43	0.01	2.4	1.28	4.47	0.01	0.318
	7	19400	<5	-	-	-	-	-	-	-
	8	295770	20	271873.37	0.01	1.53	0.59	3.98	0.38	0.4857
	9	1526	<5	-	-	-	-	-	-	-
	10	472998	78	430268.76	0.02	2.84	1.61	5	<0.001	0.2894
	Internal Reference Group	10213	<5	-	-	-	-	-	-	-
Long COVID	Control	1775965	1622	1632119.43	0.10	1.00 (Reference)	NA	NA	NA	NA
	1	7348	13	6785.62	0.19	2.37	0.84	6.72	0.1	0.531
	2	28907	36	25742.61	0.14	1.35	0.79	2.29	0.27	0.2703
	3	66312	101	60125.29	0.17	1.3	0.95	1.79	0.11	0.1632
	4	340496	270	299852.77	0.09	1.02	0.85	1.22	0.84	0.0922
	5	26361	23	22558.16	0.10	1.94	0.88	4.25	0.1	0.4011
	6	506634	793	467887.43	0.17	1.57	1.38	1.77	<0.001	0.0637
	7	19400	34	17861.76	0.19	1.74	0.98	3.1	0.06	0.2952
	8	295770	480	271873.37	0.18	1.41	1.21	1.65	<0.001	0.0782
	9	1526	6	1363.70	0.44	41404.5	0	3.53E+75	0.9	83.328
	10	472998	669	430268.76	0.16	1.34	1.17	1.54	<0.001	0.069
	Internal Reference Group	10213	13	9160.42	0.14	0.87	0.37	2.07	0.76	0.4399
Mortality	Control	1775965	1536	1632119.43	0.09	1.00 (Reference)	NA	NA	NA	NA

	1	7348	31	6785.62	0.46	203.84	34.29	1211.72	<0.001	0.9094
	2	28907	115	25742.61	0.45	9.43	5.31	16.74	<0.001	0.2931
	3	66312	70	60125.29	0.12	5.88	2.94	11.76	<0.001	0.3532
	4	340496	693	299852.77	0.23	2.3	1.92	2.75	<0.001	0.0921
	5	26361	138	22558.16	0.61	3.14	1.05	5.06	<0.001	0.2432
	6	506634	606	467887.43	0.13	2.3	1.88	2.81	<0.001	0.1026
	7	19400	22	17861.76	0.12	1.46	0.6	3.53	0.41	0.4524
	8	295770	151	271873.37	0.06	2.18	1.43	3.31	<0.001	0.2147
	9	1526	<5	-	-	-	-	-	-	-
	10	472998	762	430268.76	0.18	2.87	2.36	3.5	<0.001	0.1005
	Internal Reference Group	10213	<5	-	-	-	-	-	-	-

Summary Forest Plot of Subgroup Analysis of Age-Sex Matched & Fully Adjusted Cohort by Study Year, 2021



Subgroup Analysis of Age-Sex Matched & Fully Adjusted Cohort by Study Year, 2022

Outcome of Interest	Phenotype Level	Sample Size	Events	Person years	Incidence Rate per 100 person years	Incidence Rate Ratio	LCI	UCI	*p-value*	Non-Robust SE
COVID-19 infection (Binary)	Control	1858638	195566	1722252.10	11.36	1.00 (Reference)	NA	NA	NA	NA
	1	7380	2002	6773.09	29.56	2.48	2.28	2.7	<0.001	0.0438
	2	29689	5554	26521.85	20.94	1.96	1.87	2.06	<0.001	0.0241
	3	69588	9544	63241.97	15.09	1.26	1.22	1.3	<0.001	0.0161
	4	352701	41847	312887.73	13.37	1.22	1.2	1.24	<0.001	0.0076
	5	25821	4272	22141.43	19.29	2.02	1.92	2.13	<0.001	0.0271
	6	528016	71792	488763.00	14.69	1.24	1.22	1.25	<0.001	0.006
	7	19819	2620	18247.69	14.36	1.24	1.17	1.32	<0.001	0.0307
	8	311554	42635	288093.01	14.80	1.13	1.11	1.14	<0.001	0.0076
	9	1688	223	1525.25	14.62	1.08	0.88	1.33	0.44	0.1051
	10	501666	51501	457072.88	11.27	1.06	1.05	1.08	<0.001	0.0068
	Internal Reference Group	10716	1443	9731.44	14.83	1.42	1.31	1.54	<0.001	0.0418
COVID-19 infection (Total Count)	Control	1858638	201554	1722252.10	11.70	1.00 (Reference)	NA	NA	NA	NA
		7380	2160	6773.09	31.89	2.59	2.38	2.82	<0.001	0.0427
	2	29689	5897	26521.85	22.23	2.03	1.94	2.12	<0.001	0.0236
	3	69588	9966	63241.97	15.76	1.27	1.23	1.31	<0.001	0.0158
	4	352701	43276	312887.73	13.83	1.23	1.21	1.25	<0.001	0.0075
	5	25821	4607	22141.43	20.81	2.11	2.01	2.23	<0.001	0.0265

	6	528016	74703	488763.00	15.28	1.25	1.23	1.26	<0.001	0.0059
	7	19819	2747	18247.69	15.05	1.27	1.19	1.34	<0.001	0.0301
	8	311554	44313	288093.01	15.38	1.13	1.11	1.15	<0.001	0.0075
	9	1688	233	1525.25	15.28	1.11	0.91	1.36	0.3	0.1033
	10	501666	53424	457072.88	11.69	1.07	1.05	1.08	<0.001	0.0067
	Internal Reference Group	10716	1508	9731.44	15.50	1.44	1.32	1.56	<0.001	0.041
Multiple COVID-19 cases	Control	1858638	5749	1722252.10	0.33	1.00 (Reference)	NA	NA	NA	NA
	1	7380	146	6773.09	2.16	5.36	3.54	8.1	<0.001	0.2113
	2	29689	311	26521.85	1.17	4.27	3.28	5.55	<0.001	0.1342
	3	69588	404	63241.97	0.64	1.59	1.34	1.88	<0.001	0.0848
	4	352701	1373	312887.73	0.44	1.44	1.32	1.57	<0.001	0.0444
	5	25821	316	22141.43	1.43	5.51	4.15	7.31	<0.001	0.1442
	6	528016	2785	488763.00	0.57	1.66	1.55	1.77	<0.001	0.0337
	7	19819	120	18247.69	0.66	1.98	1.43	2.74	<0.001	0.1663
	8	311554	1589	288093.01	0.55	1.25	1.15	1.35	<0.001	0.0416
	9	1688	9	1525.25	0.59	2.09	0.63	6.96	0.23	0.6139
	10	501666	1834	457072.88	0.40	1.15	1.07	1.24	<0.001	0.0381
	11	10716	62	9731.44	0.64	1.95	1.26	3.03	<0.001	0.2239
Breakthrough infection within 3 months of vaccination(Binary)	0	1858638	84440	1722252.10	4.90	1.00 (Reference)	NA	NA	NA	NA
	1	7380	1064	6773.09	15.71	3.09	2.71	3.53	<0.001	0.0675
	2	29689	2845	26521.85	10.73	2.33	2.17	2.51	<0.001	0.0368
	3	69588	3885	63241.97	6.14	1.17	1.11	1.23	<0.001	0.0263

	4	352701	16585	312887.73	5.30	1.13	1.1	1.16	<0.001	0.0123
	5	25821	1638	22141.43	7.40	1.78	1.63	1.94	<0.001	0.0436
	6	528016	30989	488763.00	6.34	1.16	1.14	1.19	<0.001	0.0095
	7	19819	1037	18247.69	5.68	1.08	0.98	1.19	0.12	0.0503
	8	311554	17605	288093.01	6.11	1.03	1	1.05	0.04	0.0124
	9	1688	90	1525.25	5.90	1.12	0.79	1.58	0.53	0.1766
	10	501666	20051	457072.88	4.39	0.94	0.92	0.96	<0.001	0.0111
	Internal Reference Group	10716	553	9731.44	5.68	1.22	1.06	1.39	0.01	0.0698
Breakthrough infection within 3 months of vaccination (Total Count)	Control	1858638	85087	1722252.10	4.94	1.00 (Reference)	NA	NA	NA	NA
	1	7380	1110	6773.09	16.39	3.18	3.63	3.63	<0.001	0.0667
	2	29689	2934	26521.85	11.06	2.4	2.24	2.58	<0.001	0.0366
	3	69588	3941	63241.97	6.23	1.18	1.12	1.24	<0.001	0.0261
	4	352701	16799	312887.73	5.37	1.13	1.1	1.16	<0.001	0.0122
	5	25821	1683	22141.43	7.60	1.8	1.65	1.96	<0.001	0.0432
	6	528016	31398	488763.00	6.42	1.17	1.15	1.19	<0.001	0.0094
	7	19819	1054	18247.69	5.78	1.09	0.99	1.2	0.08	0.05
	8	311554	17753	288093.01	6.16	1.03	1	1.05	0.02	0.0124
	9	1688	92	1525.25	6.03	1.13	0.8	1.6	0.48	0.176
	10	501666	20259	457072.88	4.43	0.94	0.92	0.97	<0.001	0.011
	Internal Reference Group	10716	565	9731.44	5.81	1.24	1.08	1.41	<0.001	0.0692

Breakthrough infection between 4 and 6 months of vaccination (Binary)	Control	1858638	71075	1722252.10	4.13	1.00 (Reference)	NA	NA	NA	NA
	1	7380	646	6773.09	9.54	2.1	1.81	2.45	<0.001	0.0774
	2	29689	1976	26521.85	7.45	1.67	1.55	1.81	<0.001	0.0399
	3	69588	3127	63241.97	4.94	1.21	1.14	1.28	<0.001	0.0295
	4	352701	16582	312887.73	5.30	1.11	1.09	1.14	<0.001	0.0122
	5	25821	1498	22141.43	6.77	1.7	1.56	1.86	<0.001	0.0451
	6	528016	24575	488763.00	5.03	1.15	1.12	1.17	<0.001	0.0105
	7	19819	890	18247.69	4.88	1.13	1.02	1.26	0.02	0.0534
	8	311554	12862	288093.01	4.46	1.06	1.03	1.09	<0.001	0.0145
	9	1688	74	1525.25	4.85	0.95	0.65	1.4	0.8	0.1962
	10	501666	17743	457072.88	3.88	0.98	0.96	1.01	0.15	0.0117
	Internal Reference Group	10716	489	9731.44	5.02	1.73	1.47	2.03	<0.001	0.0824
Breakthrough infection between 4 and 6 months of vaccination (Total Count)	Control	1858638	71389	1722252.10	4.15	1.00 (Reference)	NA	NA	NA	NA
	1	7380	659	6773.09	9.73	2.15	1.85	2.5	<0.001	0.0771
	2	29689	2006	26521.85	7.56	1.69	1.57	1.83	<0.001	0.0397
	3	69588	3154	63241.97	4.99	1.21	1.15	1.29	<0.001	0.0294
	4	352701	16707	312887.73	5.34	1.12	1.09	1.14	<0.001	0.0122
	5	25821	1525	22141.43	6.89	1.72	1.58	1.88	<0.001	0.0448
	6	528016	24753	488763.00	5.06	1.15	1.13	1.17	<0.001	0.0104
	7	19819	900	18247.69	4.93	1.14	1.03	1.27	0.01	0.0532

	8	311554	12932	288093.01	4.49	1.06	1.03	1.09	<0.001	0.0144
	9	1688	74	1525.25	4.85	0.95	0.65	1.4	0.8	0.1962
	10	501666	17885	457072.88	3.91	0.99	0.99	1.01	0.26	0.0117
	Internal Reference Group	10716	496	9731.44	5.10	1.76	1.5	2.07	<0.001	0.082
28-day CVD (Binary)	Control	1858638	429	1722252.10	0.02	1.00 (Reference)	NA	NA	NA	NA
	1	7380	5	6773.09	0.07	37452.21	0	3.58E+70	0.89	77.5136
	2	29689	14	26521.85	0.05	2.02	0.81	5.03	0.13	0.4651
	3	69588	14	63241.97	0.02	2.64	0.92	7.57	0.07	0.5376
	4	352701	138	312887.73	0.04	1.25	0.96	1.63	0.1	0.1357
	5	25821	31	22141.43	0.14	4.58	2.06	10.19	<0.001	0.4079
	6	528016	180	488763.00	0.04	1.67	1.29	2.17	<0.001	0.1322
	7	19819	6	18247.69	0.03	2.03	0.51	8.1	0.31	0.7052
	8	311554	65	288093.01	0.02	1.63	1.05	2.54	0.03	0.2261
	9	1688	<5	-	-	-	-	-	-	-
	10	501666	224	457072.88	0.05	1.64	1.29	2.08	<0.001	0.123
	Internal Reference Group	10716	<5	-	-	-	-	-	-	-
28-day CVD (Total count)	Control	1858638	436	1722252.10	0.03	1.00 (Reference)	NA	NA	NA	NA
	1	7380	5	6773.09	0.07	38386.4	0	2.55E+70	0.89	77.3272
	2	29689	14	26521.85	0.05	2	0.81	4.98	0.13	0.4646
	3	69588	14	63241.97	0.02	2.64	0.92	7.57	0.07	0.5373
	4	352701	140	312887.73	0.04	1.21	0.93	1.58	0.15	0.1345

	5	25821	31	22141.43	0.14	4.55	2.05	10.13	<0.001	0.4079
	6	528016	180	488763.00	0.04	1.66	1.28	2.14	<0.001	0.1319
	7	19819	6	18247.69	0.03	2.05	0.52	8.13	0.31	0.7034
	8	311554	65	288093.01	0.02	1.58	1.02	2.46	0.04	0.2241
	9	1688	<5	-	-	-	-	-	-	-
	10	501666	226	457072.88	0.05	1.64	1.29	2.08	<0.001	0.122
	Internal Reference Group	10716	<5	-	-	-	-	-	-	-
28-day Blood clot (Binary)	Control	1858638	305	1722252.10	0.02	1.00 (Reference)	NA	NA	NA	NA
	1	7380	9	6773.09	0.13	135190.9	0	6.87E+99	0.92	111.2593
	2	29689	22	26521.85	0.08	7.35	2.36	22.88	<0.001	0.5796
	3	69588	23	63241.97	0.04	5.25	1.89	14.56	<0.001	0.5209
	4	352701	159	312887.73	0.05	2.66	1.95	3.63	<0.001	0.1594
	5	25821	19	22141.43	0.09	12.5	3.15	47.71	<0.001	0.7041
	6	528016	188	488763.00	0.04	2.3	1.72	3.07	<0.001	0.1481
	7	19819	11	18247.69	0.06	8.61	1.81	40.95	0.01	0.7956
	8	311554	38	288093.01	0.01	2.22	1.24	3.97	0.01	0.2961
	9	1688	<5	-	-	-	-	-	-	-
	10	501666	135	457072.88	0.03	1.12	0.85	1.49	0.42	0.1448
	Internal Reference Group	10716	<5	-	-	-	-	-	-	-
28-day Blood clot (Total Count)	Control	1858638	305	1722252.10	0.02	1.00 (Reference)	NA	NA	NA	NA
	1	7380	9	6773.09	0.13	132497.5	0	8.24E+99	0.92	111.3626

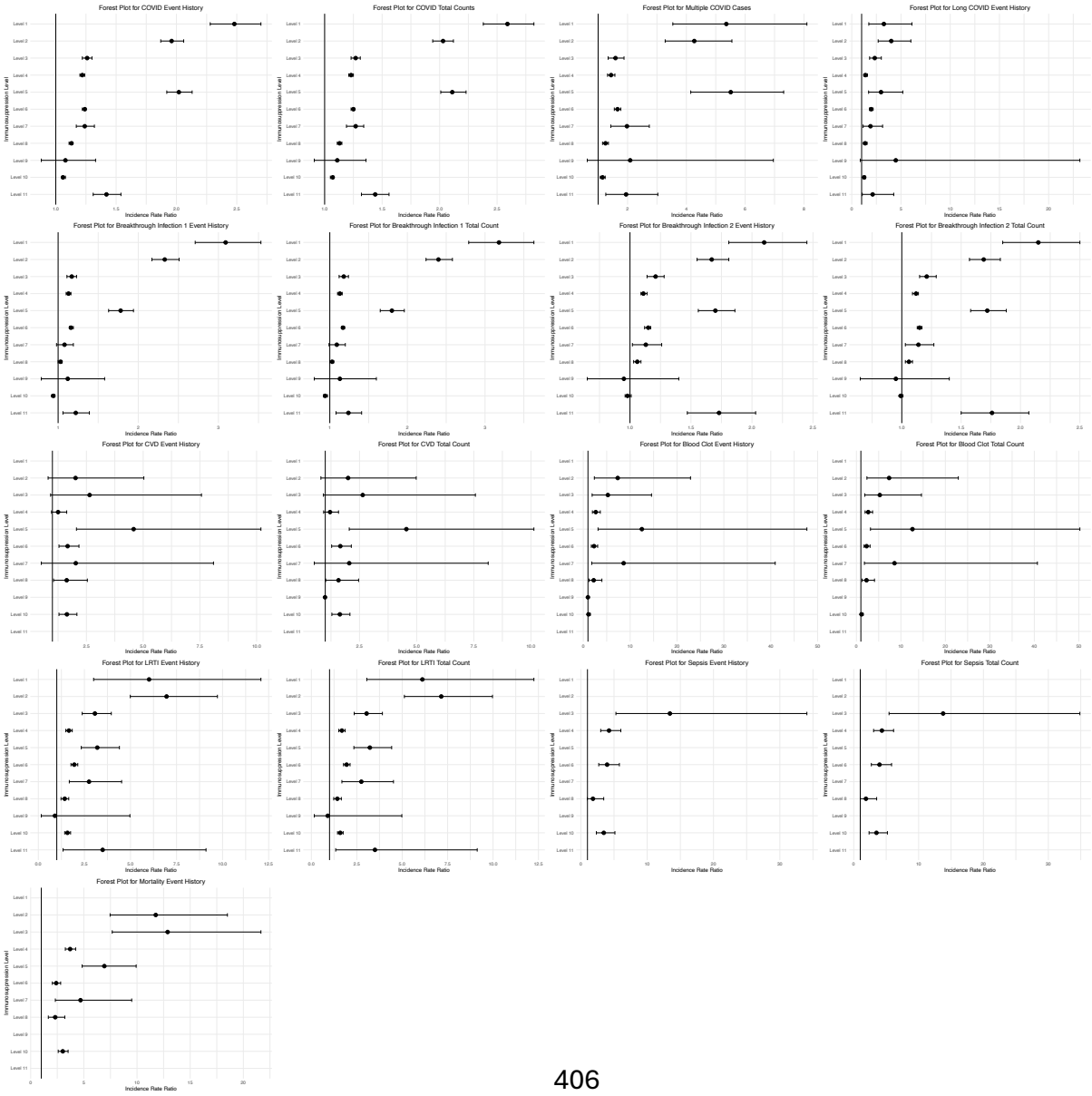
	2	29689	22	26521.85	0.08	7.35	2.36	22.91	<0.001	0.5803
	3	69588	23	63241.97	0.04	5.26	1.89	14.62	<0.001	0.5213
	4	352701	160	312887.73	0.05	2.66	1.95	3.63	<0.001	0.1595
	5	25821	19	22141.43	0.09	12.6	3.16	50.24	<0.001	0.7057
	6	528016	188	488763.00	0.04	2.29	1.72	3.07	<0.001	0.1482
	7	19819	11	18247.69	0.06	8.56	1.8	40.69	0.01	0.7954
	8	311554	39	288093.01	0.01	2.27	1.28	4.06	0.01	0.295
	9	1688	<5	-	-	-	-	-	-	-
	10	501666	138	457072.88	0.03	1.15	0.86	1.52	0.34	0.1442
	Internal Reference Group	10716	<5	-	-	-	-	-	-	-
28-day LRTI (Binary)	Control	1858638	2834	1722252.10	0.16	1.00 (Reference)	NA	NA	NA	NA
	1	7380	59	6773.09	0.87	6.01	3	12.08	<0.001	0.3557
	2	29689	268	26521.85	1.01	6.96	4.99	9.72	<0.001	0.1704
	3	69588	256	63241.97	0.40	3.07	2.38	3.96	<0.001	0.1296
	4	352701	1097	312887.73	0.35	1.66	1.49	1.84	<0.001	0.0533
	5	25821	189	22141.43	0.85	3.2	2.33	4.4	<0.001	0.1621
	6	528016	1586	488763.00	0.32	1.95	1.77	2.14	<0.001	0.0476
	7	19819	64	18247.69	0.35	2.75	1.68	4.52	<0.001	0.2527
	8	311554	532	288093.01	0.18	1.43	1.23	1.65	<0.001	0.0747
	9	1688	<5	-	-	-	-	-	-	-
	10	501666	1279	457072.88	0.28	1.58	1.43	1.75	<0.001	0.0505

	Internal Reference Group	10716	21	9731.44	0.22	3.49	1.34	9.1	0.01	0.4887
28-day LRTI (Total Count)	Control	1858638	2845	1722252.10	0.17	1.00 (Reference)	NA	NA	NA	NA
	1	7380	61	6773.09	0.90	6.11	3.05	12.25	<0.001	0.3548
	2	29689	275	26521.85	1.04	7.15	5.12	9.97	<0.001	0.1699
	3	69588	256	63241.97	0.40	3.04	2.36	3.91	<0.001	0.1291
	4	352701	1113	312887.73	0.36	1.68	1.51	1.86	<0.001	0.0531
	5	25821	190	22141.43	0.86	3.22	2.34	4.42	<0.001	0.162
	6	528016	1593	488763.00	0.33	1.94	1.77	2.13	<0.001	0.0475
	7	19819	64	18247.69	0.35	2.75	1.68	4.52	<0.001	0.2527
	8	311554	535	288093.01	0.19	1.43	1.23	1.65	<0.001	0.0746
	9	1688	<5	-	-	-	-	-	-	-
	10	501666	1288	457072.88	0.28	1.59	1.44	1.75	<0.001	0.0504
	Internal Reference Group	10716	21	9731.44	0.22	3.5	1.34	9.13	0.01	0.4888
28-day Sepsis (Binary)	Control	1858638	190	1722252.10	0.01	1.00 (Reference)	NA	NA	NA	NA
	1	7380	11	6773.09	0.16	278287.54	0	2.82E+84	0.89	92.8146
	2	29689	46	26521.85	0.17	21.61	7.21	64.78	<0.001	0.5602
	3	69588	43	63241.97	0.07	13.43	5.29	34.08	<0.001	0.4751
	4	352701	167	312887.73	0.05	4.25	3	6.03	<0.001	0.178
	5	25821	32	22141.43	0.14	30.41	6.44	143.57	<0.001	0.7919
	6	528016	137	488763.00	0.03	3.96	2.7	5.81	<0.001	0.1954
	7	19819	9	18247.69	0.05	16.89	1.71	166.41	0.02	1.1671

	8	311554	40	288093.01	0.01	1.83	0.97	3.45	0.06	0.3238
	9	1688	<5	-	-	-	-	-	-	-
	10	501666	124	457072.88	0.03	3.46	2.34	5.14	<0.001	0.201
	Internal Reference Group	10716	<5	-	-	-	-	-	-	-
28-day Sepsis (Total Count)	Control	1858638	190	1722252.10	0.01	1.00 (Reference)	NA	NA	NA	NA
	1	7380	11	6773.09	0.16	282429.99	0	2.50E+84	0.89	92.7451
	2	29689	46	26521.85	0.17	21.62	7.21	64.87	<0.001	0.5606
	3	69588	44	63241.97	0.07	13.78	5.44	34.87	<0.001	0.4739
	4	352701	170	312887.73	0.05	4.34	3.06	6.14	<0.001	0.1775
	5	25821	33	22141.43	0.15	30.68	6.49	144.98	<0.001	0.7923
	6	528016	137	488763.00	0.03	3.97	2.71	5.83	<0.001	0.1956
	7	19819	9	18247.69	0.05	16.85	1.71	166.04	0.02	1.1673
	8	311554	41	288093.01	0.01	1.88	1	3.53	0.05	0.3218
	9	1688	<5	-	-	-	-	-	-	-
	10	501666	125	457072.88	0.03	3.5	2.36	5.19	<0.001	0.2009
	Internal Reference Group	10716	<5	-	-	-	-	-	-	-
Long COVID	Control	1858638	2389	1722252.10	0.14	1.00 (Reference)	NA	NA	NA	NA
	1	7380	47	6773.09	0.69	3.26	1.73	6.11	<0.001	0.3214
	2	29689	131	26521.85	0.49	4.01	2.68	6	<0.001	0.2054
	3	69588	225	63241.97	0.36	2.33	1.81	3	<0.001	0.1296
	4	352701	583	312887.73	0.19	1.39	1.22	1.59	<0.001	0.0668

	5	25821	56	22141.43	0.25	2.97	1.71	5.18	<0.001	0.2831
	6	528016	1451	488763.00	0.30	1.97	1.79	2.17	<0.001	0.0495
	7	19819	52	18247.69	0.28	1.9	1.15	3.13	0.01	0.2546
	8	311554	644	288093.01	0.22	1.36	1.2	1.55	<0.001	0.0662
	9	1688	6	1525.25	0.39	4.47	0.86	23.17	0.07	0.839
	10	501666	845	457072.88	0.18	1.26	1.12	1.4	<0.001	0.0573
	Internal Reference Group	10716	24	9731.44	0.25	2.12	1.06	4.26	0.03	0.3556
Mortality	Control	1858638	1565	1722252.10	0.09	1.00 (Reference)	NA	NA	NA	NA
	1	7380	27	6773.09	0.40	91.43	19.42	430.46	<0.001	0.7905
	2	29689	138	26521.85	0.52	11.76	7.47	18.5	<0.001	0.2312
	3	69588	103	63241.97	0.16	12.88	7.67	21.65	<0.001	0.2648
	4	352701	1017	312887.73	0.33	3.71	3.26	4.23	<0.001	0.0666
	5	25821	168	22141.43	0.76	6.93	4.84	9.92	<0.001	0.1831
	6	528016	579	488763.00	0.12	2.4	2.04	2.82	<0.001	0.0824
	7	19819	34	18247.69	0.19	4.69	2.32	9.5	<0.001	0.3597
	8	311554	142	288093.01	0.05	2.31	1.66	3.21	<0.001	0.168
	9	1688	<5	-	-	-	-	-	-	-
	10	501666	677	457072.88	0.15	3.02	2.59	3.52	<0.001	0.0779
	Internal Reference Group	10716	<5	-	-	-	-	-	-	-

Summary Forest Plot of Subgroup Analysis of Age-Sex Matched & Fully Adjusted Cohort by Study Year, 2022



Subgroup Analysis of Age-Sex Matched & Fully Adjusted Cohort by Study Year, 2023

Outcome of Interest	Phenotype Level	Sample Size	Events	Person years	Incidence Rate per 100 person years	Incidence Rate Ratio	LCI	UCI	*p-value*	Non-Robust SE
COVID-19 infection (Binary)	Control	1961076	20290	1812485.11	1.12	1.00 (Reference)	NA	NA	NA	NA
	1	7502	445	6884.15	6.46	7.75	5.85	10.28	<0.001	0.1436
	2	30770	1345	27601.43	4.87	4.29	3.79	4.85	<0.001	0.0632
	3	74144	1527	67180.12	2.27	2.47	2.24	2.72	<0.001	0.0495
	4	367269	8933	326814.74	2.73	2.04	1.96	2.12	<0.001	0.0192
	5	25858	1254	21946.65	5.71	3.73	3.31	4.21	<0.001	0.0612
	6	553947	11453	512795.13	2.23	2.05	1.98	2.12	<0.001	0.0175
	7	20375	414	18774.64	2.21	1.9	1.6	2.27	<0.001	0.0897
	8	331663	3950	306463.67	1.29	1.48	1.4	1.56	<0.001	0.0269
	9	1896	26	1703.47	1.53	0.95	0.51	1.77	0.88	0.3152
	10	535767	7740	488443.68	1.58	1.44	1.39	1.5	<0.001	0.0192
	Internal Reference Group	11885	145	10630.55	1.36	2.71	1.97	3.73	<0.001	0.1631
COVID-19 infection (Total Count)	Control	1961076	20627	1812485.11	1.14	1.00 (Reference)	NA	NA	NA	NA
		7502	460	6884.15	6.68	8.04	6.07	10.65	<0.001	0.1432
	2	30770	1402	27601.43	5.08	4.4	3.9	4.98	<0.001	0.0624
	3	74144	1576	67180.12	2.35	2.5	2.28	2.76	<0.001	0.049
	4	367269	9127	326814.74	2.79	2.05	1.97	2.13	<0.001	0.0191

	5	25858	1300	21946.65	5.92	3.83	3.4	4.32	<0.001	0.0607
	6	553947	11781	512795.13	2.30	2.07	2	2.14	<0.001	0.0173
	7	20375	423	18774.64	2.25	1.91	1.61	2.28	<0.001	0.0888
	8	331663	4048	306463.67	1.32	1.48	1.41	1.56	<0.001	0.0266
	9	1896	27	1703.47	1.58	1	0.54	1.84	1	0.3118
	10	535767	7913	488443.68	1.62	1.45	1.4	1.5	<0.001	0.0191
	Internal Reference Group	11885	153	10630.55	1.44	2.8	2.05	3.83	<0.001	0.1595
Multiple COVID-19 cases	Control	1961076	321	1812485.11	0.02	1.00 (Reference)	NA	NA	NA	NA
	1	7502	14	6884.15	0.20	107080.98	0	1.37E+76	0.89	83.5345
	2	30770	53	27601.43	0.19	13.85	5.33	36.03	<0.001	0.4877
	3	74144	47	67180.12	0.07	4.85	2.39	9.85	<0.001	0.3617
	4	367269	184	326814.74	0.06	2.58	1.92	3.47	<0.001	0.151
	5	25858	44	21946.65	0.20	17.19	5.01	58.97	<0.001	0.6289
	6	553947	309	512795.13	0.06	3.47	2.68	4.5	<0.001	0.1318
	7	20375	9	18774.64	0.05	3.27	0.94	11.39	0.06	0.6373
	8	331663	95	306463.67	0.03	2.19	1.47	3.26	<0.001	0.2038
	9	1896	<5	-	-	-	-	-	-	-
	10	535767	165	488443.68	0.03	2.05	1.53	2.75	<0.001	0.1501
	11	11885	6	10630.55	0.06	3.47	0.66	18.24	0.14	0.8467
Breakthrough infection within 3 months of vaccination(Binary)	0	1961076	3429	1812485.11	0.19	1.00 (Reference)	NA	NA	NA	NA
	1	7502	116	6884.15	1.69	23.07	9.28	57.37	<0.001	0.4647
	2	30770	349	27601.43	1.26	5.57	4.23	7.35	<0.001	0.1409

	3	74144	294	67180.12	0.44	3.23	2.52	4.16	<0.001	0.1281
	4	367269	1753	326814.74	0.54	2.16	1.97	2.36	<0.001	0.0455
	5	25858	209	21946.65	0.95	3.5	2.62	4.76	<0.001	0.1473
	6	553947	2311	512795.13	0.45	2.41	2.22	2.62	<0.001	0.0425
	7	20375	76	18774.64	0.40	1.95	1.28	2.98	<0.001	0.2153
	8	331663	561	306463.67	0.18	1.62	1.39	1.87	<0.001	0.0753
	9	1896	<5	-	-	-	-	-	-	-
	10	535767	1236	488443.68	0.25	1.4	1.27	1.54	<0.001	0.0489
	Internal Reference Group	11885	35	10630.55	0.33	7.19	2.78	18.55	<0.001	0.4839
Breakthrough infection within 3 months of vaccination (Total Count)	Control	1961076	3444	1812485.11	0.19	1.00 (Reference)	NA	NA	NA	NA
	1	7502	118	6884.15	1.71	23.4	9.42	58.15	<0.001	0.4644
	2	30770	352	27601.43	1.28	5.63	4.27	7.42	<0.001	0.1407
	3	74144	299	67180.12	0.45	3.25	2.53	4.17	<0.001	0.1273
	4	367269	1760	326814.74	0.54	2.15	1.97	2.35	<0.001	0.0453
	5	25858	213	21946.65	0.97	3.59	2.69	4.79	<0.001	0.1467
	6	553947	2333	512795.13	0.45	2.43	2.24	2.64	<0.001	0.0423
	7	20375	76	18774.64	0.40	1.95	1.28	2.98	<0.001	0.2153
	8	331663	563	306463.67	0.18	1.62	1.4	1.88	<0.001	0.0752
	9	1896	<5	-	-	-	-	-	-	-
	10	535767	1242	488443.68	0.25	1.4	1.27	1.54	<0.001	0.0488
	Internal Reference Group	11885	35	10630.55	0.33	7.19	2.79	18.57	<0.001	0.484

Breakthrough infection between 4 and 6 months of vaccination (Binary)	Control	1961076	8253	1812485.11	0.46	1.00 (Reference)	NA	NA	NA	NA
	1	7502	170	6884.15	2.47	8.81	5.27	14.72	<0.001	0.2621
	2	30770	591	27601.43	2.14	4.07	3.36	4.92	<0.001	0.097
	3	74144	524	67180.12	0.78	2.32	1.96	2.74	<0.001	0.0859
	4	367269	3895	326814.74	1.19	1.78	1.68	1.88	<0.001	0.029
	5	25858	496	21946.65	2.26	3.01	2.52	3.6	<0.001	0.0916
	6	553947	4546	512795.13	0.89	2.01	1.9	2.12	<0.001	0.0284
	7	20375	141	18774.64	0.75	1.7	1.26	2.29	<0.001	0.1526
	8	331663	1252	306463.67	0.41	1.54	1.39	1.7	<0.001	0.0501
	9	1896	9	1703.47	0.53	0.9	0.33	2.5	0.85	0.5185
	10	535767	2820	488443.68	0.58	1.36	1.28	1.45	<0.001	0.0319
	Internal Reference Group	11885	43	10630.55	0.40	4.25	1.98	9.12	<0.001	0.3897
Breakthrough infection between 4 and 6 months of vaccination (Total Count)	Control	1961076	8307	1812485.11	0.46	1.00 (Reference)	NA	NA	NA	NA
	1	7502	172	6884.15	2.50	8.86	5.3	14.81	<0.001	0.262
	2	30770	600	27601.43	2.17	4.06	3.37	4.91	<0.001	0.0963
	3	74144	530	67180.12	0.79	2.33	1.97	2.76	<0.001	0.0855
	4	367269	3927	326814.74	1.20	1.78	1.68	1.88	<0.001	0.0289
	5	25858	501	21946.65	2.28	3.05	2.55	3.66	<0.001	0.0915
	6	553947	4588	512795.13	0.89	2.01	1.9	2.13	<0.001	0.0283
	7	20375	142	18774.64	0.76	1.71	1.27	2.3	<0.001	0.1523
	8	331663	1256	306463.67	0.41	1.53	1.38	1.68	<0.001	0.05

	9	1896	9	1703.47	0.53	0.91	0.33	2.51	0.85	0.5186
	10	535767	2843	488443.68	0.58	1.37	1.29	1.46	<0.001	0.0319
	Internal Reference Group	11885	44	10630.55	0.41	4.36	2.04	9.32	<0.001	0.387
28-day CVD (Binary)	Control	1961076	157	1812485.11	0.01	1.00 (Reference)	NA	NA	NA	NA
	1	7502	5	6884.15	0.07	68617.72	0	1.12E+129	0.94	145.9215
	2	30770	8	27601.43	0.03	2.94	0.73	11.89	0.13	0.7125
	3	74144	8	67180.12	0.01	2.65	0.54	12.96	0.23	0.8106
	4	367269	63	326814.74	0.02	2.64	1.6	4.36	<0.001	0.2556
	5	25858	14	21946.65	0.06	1.36	0.53	3.53	0.52	0.4855
	6	553947	93	512795.13	0.02	3.24	2.07	5.07	<0.001	0.229
	7	20375	<5	-	-	-	-	-	-	-
	8	331663	23	306463.67	0.01	2.3	1.01	5.26	0.05	0.4216
	9	1896	<5	-	-	-	-	-	-	-
	10	535767	105	488443.68	0.02	2.93	1.94	4.43	<0.001	0.2114
	Internal Reference Group	11885	<5	-	-	-	-	-	-	-
28-day CVD (Total count)	Control	1961076	157	1812485.11	0.01	1.00 (Reference)	NA	NA	NA	NA
	1	7502	5	6884.15	0.07	68617.71	0	1.12E+129	0.94	145.9215
	2	30770	8	27601.43	0.03	2.94	0.73	11.89	0.13	0.7125
	3	74144	8	67180.12	0.01	2.65	0.54	12.96	0.23	0.8106
	4	367269	63	326814.74	0.02	2.64	1.6	4.36	<0.001	0.2556
	5	25858	14	21946.65	0.06	1.36	0.53	3.53	0.52	0.4855

	6	553947	93	512795.13	0.02	3.24	2.07	5.07	<0.001	0.229
	7	20375	<5	-	-	-	-	-	-	-
	8	331663	23	306463.67	0.01	2.3	1.01	5.26	0.05	0.4216
	9	1896	<5	-	-	-	-	-	-	-
	10	535767	105	488443.68	0.02	2.93	1.94	4.43	<0.001	0.2114
	Internal Reference Group	11885	<5	-	-	-	-	-	-	-
28-day Blood clot (Binary)	Control	1961076	99	1812485.11	0.01	1.00 (Reference)	NA	NA	NA	NA
	1	7502	<5	-	-	-	-	-	-	-
	2	30770	5	27601.43	0.02	3.79	0.47	30.51	0.21	1.0638
	3	74144	13	67180.12	0.02	5.71	1.05	31.02	0.04	0.8639
	4	367269	76	326814.74	0.02	4.49	2.57	7.85	<0.001	0.2847
	5	25858	<5	-	-	-	-	-	-	-
	6	553947	68	512795.13	0.01	3.85	2.24	6.62	<0.001	0.2761
	7	20375	<5	-	-	-	-	-	-	-
	8	331663	12	306463.67	0.00	0.96	0.39	2.35	0.94	0.4554
	9	1896	<5	-	-	-	-	-	-	-
	10	535767	49	488443.68	0.01	1.66	0.98	2.82	0.06	0.2695
	Internal Reference Group	11885	<5	-	-	-	-	-	-	-
28-day Blood clot (Total Count)	Control	1961076	99	1812485.11	0.01	1.00 (Reference)	NA	NA	NA	NA
	1	7502	<5	-	-	-	-	-	-	-
	2	30770	5	27601.43	0.02	3.79	0.47	30.51	0.21	1.0638

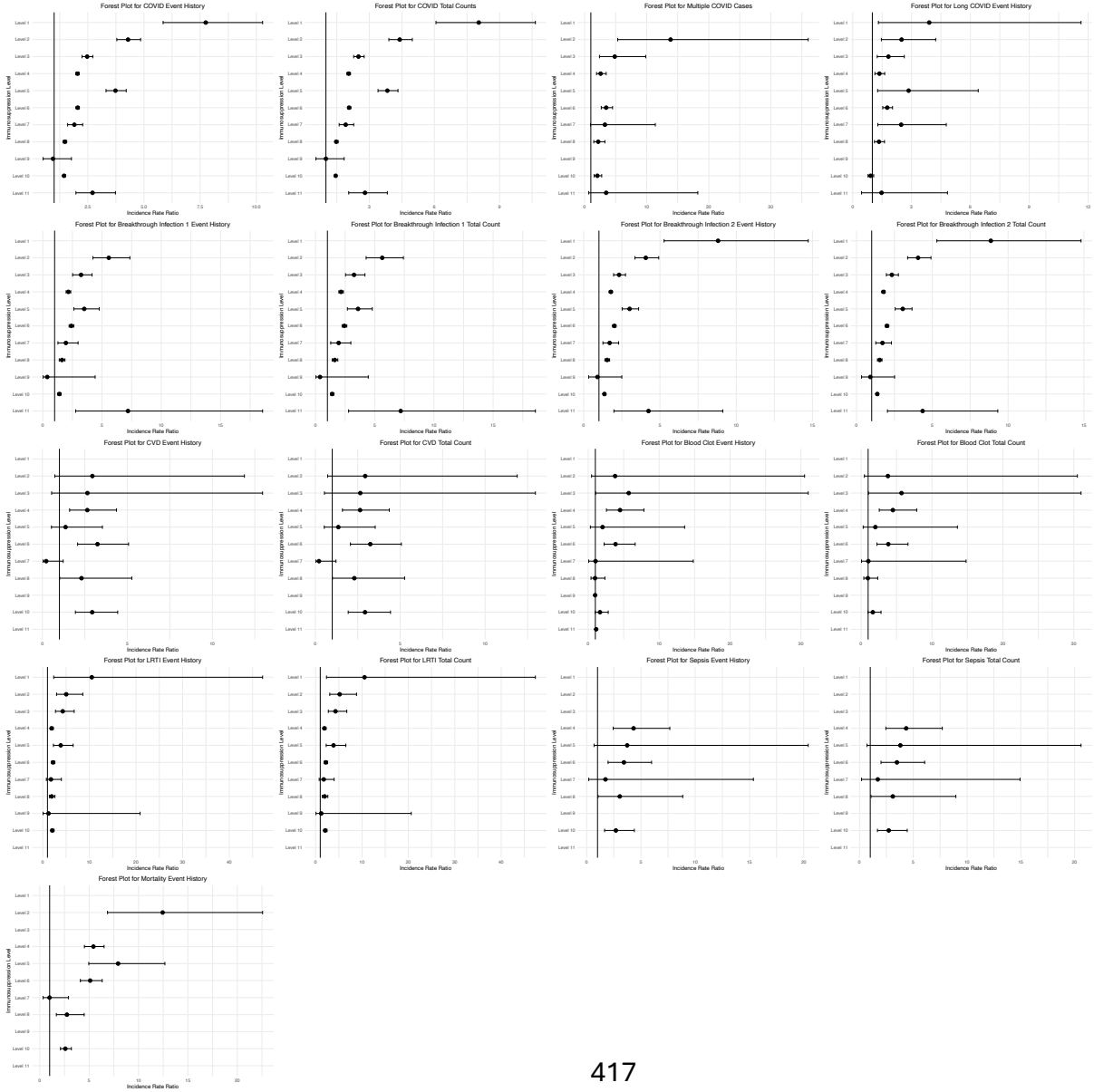
	3	74144	13	67180.12	0.02	5.71	1.05	31.02	0.04	0.8639
	4	367269	76	326814.74	0.02	4.49	2.57	7.85	<0.001	0.2847
	5	25858	<5	-	-	-	-	-	-	-
	6	553947	68	512795.13	0.01	3.85	2.24	6.62	<0.001	0.2761
	7	20375	<5	-	-	-	-	-	-	-
	8	331663	12	306463.67	0.00	0.96	0.39	2.35	0.94	0.4554
	9	1896	<5	-	-	-	-	-	-	-
	10	535767	49	488443.68	0.01	1.66	0.98	2.82	0.06	0.2695
	Internal Reference Group	11885	<5	-	-	-	-	-	-	-
28-day LRTI (Binary)	Control	1961076	940	1812485.11	0.05	1.00 (Reference)	NA	NA	NA	NA
	1	7502	21	6884.15	0.31	10.51	2.34	47.16	<0.001	0.7658
	2	30770	85	27601.43	0.31	5.03	2.95	8.58	<0.001	0.2722
	3	74144	102	67180.12	0.15	4.28	2.72	6.73	<0.001	0.231
	4	367269	468	326814.74	0.14	1.9	1.6	2.25	<0.001	0.087
	5	25858	63	21946.65	0.29	3.85	2.28	6.51	<0.001	0.2679
	6	553947	544	512795.13	0.11	2.2	1.87	2.6	<0.001	0.0848
	7	20375	19	18774.64	0.10	1.75	0.77	3.99	0.18	0.4202
	8	331663	153	306463.67	0.05	1.91	1.41	2.6	<0.001	0.1565
	9	1896	<5	-	-	-	-	-	-	-
	10	535767	508	488443.68	0.10	2.04	1.74	2.42	<0.001	0.0862
	Internal Reference Group	11885	<5	-	-	-	-	-	-	-

28-day LRTI (Total Count)	Control	1961076	944	1812485.11	0.05	1.00 (Reference)	NA	NA	NA	NA
	1	7502	21	6884.15	0.31	10.54	2.35	47.37	<0.001	0.7665
	2	30770	89	27601.43	0.32	5.19	3.05	8.82	<0.001	0.2709
	3	74144	103	67180.12	0.15	4.29	2.74	6.72	<0.001	0.2287
	4	367269	471	326814.74	0.14	1.9	1.6	2.25	<0.001	0.0867
	5	25858	63	21946.65	0.29	3.86	2.28	6.52	<0.001	0.2681
	6	553947	548	512795.13	0.11	2.2	1.87	2.6	<0.001	0.0846
	7	20375	19	18774.64	0.10	1.75	0.77	3.99	0.18	0.4205
	8	331663	155	306463.67	0.05	1.95	1.43	2.64	<0.001	0.1562
	9	1896	<5	-	-	-	-	-	-	-
	10	535767	515	488443.68	0.11	2.08	1.76	2.46	<0.001	0.0859
	Internal Reference Group	11885	<5	-	-	-	-	-	-	-
28-day Sepsis (Binary)	Control	1961076	98	1812485.11	0.01	1.00 (Reference)	NA	NA	NA	NA
	1	7502	10	6884.15	0.15	348096759	0	1.17E+174	0.92	194.4578
	2	30770	30	27601.43	0.11	47.3	9.33	239.82	<0.001	0.8282
	3	74144	23	67180.12	0.03	34.67	4.44	270.45	<0.001	1.0481
	4	367269	65	326814.74	0.02	4.32	2.44	7.66	<0.001	0.2923
	5	25858	9	21946.65	0.04	3.73	0.68	20.41	0.13	0.8665
	6	553947	72	512795.13	0.01	3.43	1.97	5.98	<0.001	0.2834
	7	20375	<5	-	-	-	-	-	-	-
	8	331663	16	306463.67	0.01	3.05	1.05	8.85	0.04	0.5435
	9	1896	<5	-	-	-	-	-	-	-

	10	535767	83	488443.68	0.02	2.69	1.65	4.39	<0.001	0.2494
	Internal Reference Group	11885	<5	-	-	-	-	-	-	-
28-day Sepsis (Total Count)	Control	1961076	99	1812485.11	0.01	1.00 (Reference)	NA	NA	NA	NA
	1	7502	11	6884.15	0.16	291823211.7	0	8.17E+167	0.92	187.3164
	2	30770	30	27601.43	0.11	27.49	6.88	109.85	<0.001	0.7067
	3	74144	23	67180.12	0.03	34.73	4.45	271.14	<0.001	1.0484
	4	367269	65	326814.74	0.02	4.34	2.45	7.7	<0.001	0.2922
	5	25858	9	21946.65	0.04	3.8	0.7	20.6	0.12	0.862
	6	553947	73	512795.13	0.01	3.48	2	6.06	<0.001	0.2823
	7	20375	<5	-	-	-	-	-	-	-
	8	331663	16	306463.67	0.01	3.1	1.07	8.96	0.04	0.5424
	9	1896	<5	-	-	-	-	-	-	-
	10	535767	83	488443.68	0.02	2.72	1.67	4.44	<0.001	0.2493
	Internal Reference Group	11885	<5	-	-	-	-	-	-	-
Long COVID	Control	1961076	1260	1812485.11	0.07	1.00 (Reference)	NA	NA	NA	NA
	1	7502	20	6884.15	0.29	3.9	1.31	11.64	0.01	0.5578
	2	30770	60	27601.43	0.22	2.49	1.46	4.23	<0.001	0.2717
	3	74144	95	67180.12	0.14	1.82	1.25	2.63	<0.001	0.1891
	4	367269	299	326814.74	0.09	1.36	1.13	1.63	<0.001	0.0948
	5	25858	28	21946.65	0.13	2.85	1.27	6.4	0.01	0.4125
	6	553947	660	512795.13	0.13	1.76	1.53	2.03	<0.001	0.0722

	7	20375	31	18774.64	0.17	2.47	1.28	4.77	0.01	0.3362
	8	331663	310	306463.67	0.10	1.34	1.11	1.62	<0.001	0.0957
	9	1896	<5	-	-	-	-	-	-	-
	10	535767	376	488443.68	0.08	0.91	0.78	1.07	0.27	0.0807
	Internal Reference Group	11885	9	10630.55	0.08	1.47	0.45	4.83	0.52	0.6058
Mortality	Control	1961076	780	1812485.11	0.04	1.00 (Reference)	NA	NA	NA	NA
	1	7502	11	6884.15	0.16	92047.29	0	5.47E+51	0.84	54.9496
	2	30770	70	27601.43	0.25	12.44	6.86	22.56	<0.001	0.3035
	3	74144	63	67180.12	0.09	30.33	14.1	65.24	<0.001	0.3908
	4	367269	599	326814.74	0.18	5.43	4.52	6.51	<0.001	0.0934
	5	25858	100	21946.65	0.46	7.93	4.96	12.67	<0.001	0.2391
	6	553947	413	512795.13	0.08	5.1	4.11	6.32	<0.001	0.1097
	7	20375	11	18774.64	0.06	0.99	0.34	2.91	0.99	0.549
	8	331663	66	306463.67	0.02	2.75	1.68	4.5	<0.001	0.2515
	9	1896	<5	-	-	-	-	-	-	-
	10	535767	360	488443.68	0.07	2.59	2.1	3.2	<0.001	0.1082
	Internal Reference Group	11885	<5	-	-	-	-	-	-	-

Summary Forest Plot of Subgroup Analysis of Age-Sex Matched & Fully Adjusted Cohort by Study Year, 2023



Summary Table for Incidence Rates per 100 Person-years by Study Year

Outcome of Interest	Phenotype Level	Incidence Rate per 100 person-years, 2020	Incidence Rate per 100 person-years, 2021	Incidence Rate per 100 person-years, 2022	Incidence Rate per 100 person-years, 2023
COVID-19 infection (Binary)	Control	2.22	8.13	11.36	1.12
	1	3.21	12.94	29.56	6.46
	2	2.65	8.15	20.94	4.87
	3	3.33	10.90	15.09	2.27
	4	2.36	6.96	13.37	2.73
	5	3.77	8.43	19.29	5.71
	6	3.05	10.42	14.69	2.23
	7	3.19	9.84	14.36	2.21
	8	3.48	13.30	14.80	1.29
	9	3.18	12.61	14.62	1.53
	10	3.28	8.68	11.27	1.58
	Internal Reference Group	2.73	11.06	14.83	1.36
COVID-19 infection (Total Count)	Control	2.24	8.26	11.70	1.14
	1	3.27	13.50	31.89	6.68
	2	2.72	8.36	22.23	5.08
	3	3.37	11.11	15.76	2.35
	4	2.40	7.06	13.83	2.79
	5	3.91	8.60	20.81	5.92
	6	3.09	10.60	15.28	2.3
	7	3.24	10.06	15.05	2.25
	8	3.52	13.58	15.38	1.32
	9	3.26	12.91	15.28	1.58
	10	3.33	8.82	11.69	1.62
	Internal Reference Group	2.77	11.38	15.50	1.44
Multiple COVID-19 cases	Control	0.03	0.13	0.33	0.02
	1	0.04	0.52	2.16	0.2
	2	0.06	0.19	1.17	0.19
	3	0.04	0.21	0.64	0.07
	4	0.04	0.09	0.44	0.06
	5	0.13	0.16	1.43	0.2

	6	0.04	0.18	0.57	0.06
	7	0.04	0.21	0.66	0.05
	8	0.04	0.27	0.55	0.03
	9	0.08	0.29	0.59	0.06
	10	0.05	0.13	0.40	0.03
	11	0.05	0.31	0.64	0.06
Breakthrough infection within 3 months of vaccination (Binary)	0	NA	2.43	4.90	0.19
	1	NA	5.67	15.71	1.69
	2	NA	3.06	10.73	1.26
	3	NA	3.04	6.14	0.44
	4	NA	2.24	5.30	0.54
	5	NA	2.51	7.40	0.95
	6	NA	3.16	6.34	0.45
	7	NA	2.92	5.68	0.4
	8	NA	3.74	6.11	0.18
	9	NA	3.52	5.90	0.06
	10	NA	2.39	4.39	0.25
	Internal Reference Group	NA	3.74	5.68	0.33
Breakthrough infection within 3 months of vaccination (Total Count)	Control	NA	2.44	4.94	0.19
	1	NA	5.76	16.39	1.71
	2	NA	3.08	11.06	1.28
	3	NA	3.05	6.23	0.45
	4	NA	2.25	5.37	0.54
	5	NA	2.54	7.60	0.97
	6	NA	3.18	6.42	0.45
	7	NA	2.93	5.78	0.4
	8	NA	3.76	6.16	0.18
	9	NA	3.52	6.03	0.06
	10	NA	2.40	4.43	0.25
	Internal Reference Group	NA	3.77	5.81	0.33
Breakthrough infection between 4 and 6 months of vaccination (Binary)	Control	NA	3.02	4.13	0.46

	1	NA	3.64	9.54	2.47
	2	NA	2.35	7.45	2.14
	3	NA	3.25	4.94	0.78
	4	NA	2.32	5.30	1.19
	5	NA	2.12	6.77	2.26
	6	NA	3.66	5.03	0.89
	7	NA	3.11	4.88	0.75
	8	NA	4.47	4.46	0.41
	9	NA	4.03	4.85	0.53
	10	NA	2.56	3.88	0.58
	Internal Reference Group	NA	2.73	5.02	0.4
Breakthrough infection between 4 and 6 months of vaccination (Total Count)	Control	NA	3.03	4.15	0.46
	1	NA	3.67	9.73	2.5
	2	NA	2.37	7.56	2.17
	3	NA	3.27	4.99	0.79
	4	NA	2.32	5.34	1.2
	5	NA	2.13	6.89	2.28
	6	NA	3.68	5.06	0.89
	7	NA	3.12	4.93	0.76
	8	NA	4.48	4.49	0.41
	9	NA	4.11	4.85	0.53
	10	NA	2.57	3.91	0.58
	Internal Reference Group	NA	2.74	5.10	0.41
28-day CVD (Binary)	Control	NA	0.01	0.02	0.01
	1	NA	0.04	0.07	0.07
	2	NA	0.02	0.05	0.03
	3	NA	0.01	0.02	0.01
	4	NA	0.01	0.04	0.02
	5	NA	0.04	0.14	0.06
	6	NA	0.01	0.04	0.02
	7	NA	0.02	0.03	0.01
	8	NA	0.01	0.02	0.01
	9	NA	0.00	0.00	0.06

	10	NA	0.02	0.05	0.02
	Internal Reference Group	NA	0.01	0.01	0
28-day CVD (Total count)	Control	0.01	0.01	0.03	0.01
	1	0.01	0.04	0.07	0.07
	2	0.01	0.02	0.05	0.03
	3	0.01	0.01	0.02	0.01
	4	0.01	0.01	0.04	0.02
	5	0.05	0.04	0.14	0.06
	6	0.01	0.01	0.04	0.02
	7	0.01	0.02	0.03	0.01
	8	0.01	0.01	0.02	0.01
	9	0.00	0.00	0.00	0.06
	10	0.01	0.02	0.05	0.02
	Internal Reference Group	0.01	0.01	0.01	0
28-day Blood clot (Binary)	Control	0.01	0.02	0.02	0.01
	1	0.01	0.07	0.13	0.03
	2	0.01	0.08	0.08	0.02
	3	0.01	0.03	0.04	0.02
	4	0.01	0.03	0.05	0.02
	5	0.05	0.04	0.09	0.02
	6	0.01	0.03	0.04	0.01
	7	0.02	0.03	0.06	0.01
	8	0.01	0.01	0.01	0
	9	0.00	0.00	0.00	0
	10	0.01	0.03	0.03	0.01
	Internal Reference Group	0.01	0.00	0.03	0
28-day Blood clot (Total Count)	Control	0.01	0.02	0.02	0.01
	1	0.01	0.07	0.13	0.03
	2	0.01	0.08	0.08	0.02
	3	0.02	0.03	0.04	0.02
	4	0.02	0.03	0.05	0.02
	5	0.03	0.04	0.09	0.02
	6	0.02	0.03	0.04	0.01

	7	0.02	0.03	0.06	0.01
	8	0.01	0.01	0.01	0
	9	0.00	0.00	0.00	0
	10	0.02	0.03	0.03	0.01
	Internal Reference Group	0.01	0.00	0.03	0
28-day LRTI (Binary)	Control	0.01	0.16	0.16	0.05
	1	0.01	1.09	0.87	0.31
	2	0.01	0.58	1.01	0.31
	3	0.02	0.32	0.40	0.15
	4	0.02	0.23	0.35	0.14
	5	0.03	0.52	0.85	0.29
	6	0.02	0.31	0.32	0.11
	7	0.02	0.36	0.35	0.1
	8	0.01	0.21	0.18	0.05
	9	0.00	0.07	0.26	0.06
	10	0.02	0.33	0.28	0.1
	Internal Reference Group	0.01	0.17	0.22	0.04
28-day LRTI (Total Count)	Control	0.08	0.16	0.17	0.05
	1	0.22	1.11	0.90	0.31
	2	0.16	0.59	1.04	0.32
	3	0.15	0.32	0.40	0.15
	4	0.13	0.23	0.36	0.14
	5	0.27	0.52	0.86	0.29
	6	0.14	0.31	0.33	0.11
	7	0.14	0.36	0.35	0.1
	8	0.10	0.21	0.19	0.05
	9	0.00	0.07	0.26	0.06
	10	0.18	0.33	0.28	0.11
	Internal Reference Group	0.08	0.17	0.22	0.04
28-day Sepsis (Binary)	Control	0.08	0.01	0.01	0.01
	1	0.22	0.06	0.16	0.15
	2	0.16	0.11	0.17	0.11
	3	0.15	0.03	0.07	0.03

	4	0.13	0.02	0.05	0.02
	5	0.28	0.07	0.14	0.04
	6	0.14	0.01	0.03	0.01
	7	0.15	0.01	0.05	0.02
	8	0.10	0.01	0.01	0.01
	9	0.00	0.00	0.00	0
	10	0.19	0.02	0.03	0.02
	Internal Reference Group	0.08	0.00	0.01	0.01
28-day Sepsis (Total Count)	Control	0.00	0.01	0.01	0.01
	1	0.07	0.06	0.16	0.16
	2	0.03	0.11	0.17	0.11
	3	0.02	0.03	0.07	0.03
	4	0.01	0.02	0.05	0.02
	5	0.04	0.07	0.15	0.04
	6	0.01	0.01	0.03	0.01
	7	0.00	0.01	0.05	0.02
	8	0.00	0.01	0.01	0.01
	9	0.00	0.00	0.00	0
	10	0.01	0.02	0.03	0.02
	Internal Reference Group	0.00	0.00	0.01	0.01
Long COVID	Control	0.00	0.10	0.14	0.07
	1	0.07	0.19	0.69	0.29
	2	0.04	0.14	0.49	0.22
	3	0.02	0.17	0.36	0.14
	4	0.01	0.09	0.19	0.09
	5	0.04	0.10	0.25	0.13
	6	0.01	0.17	0.30	0.13
	7	0.00	0.19	0.28	0.17
	8	0.00	0.18	0.22	0.1
	9	0.00	0.44	0.39	0
	10	0.01	0.16	0.18	0.08
	Internal Reference Group	0.00	0.14	0.25	0.08
Mortality	Control	0.09	0.09	0.09	0.04

	1	0.32	0.46	0.40	0.16
	2	0.29	0.45	0.52	0.25
	3	0.15	0.12	0.16	0.09
	4	0.22	0.23	0.33	0.18
	5	0.65	0.61	0.76	0.46
	6	0.12	0.13	0.12	0.08
	7	0.19	0.12	0.19	0.06
	8	0.06	0.06	0.05	0.02
	9	0.16	0.15	0.07	0
	10	0.18	0.18	0.15	0.07
	Internal Reference Group	0.03	0.04	0.04	0.02

Appendix 26: Subgroup Analysis of Age-Sex Matched & Fully Adjusted Outcomes of Interest by Vaccine Uptake

Subgroup Analysis of Age-Sex Matched & Fully Adjusted Cohort by Vaccine Uptake, Unvaccinated

Outcome of Interest	Phenotype Level	Sample Size	Events	Person years	Incidence Rate per 100 person years	Incidence Rate Ratio	LCI	UCI	*p-value*	Non-Robust SE
COVID-19 infection (Binary)	Control	296201	19277	604062.93	3.19	1.00 (Reference)	NA	NA	NA	NA
	1	1077	122	1635.24	7.46	2.9	2	4.21	<0.001	0.1892
	2	4947	422	6288.12	6.71	2.11	1.75	2.54	<0.001	0.0947
	3	15502	1479	30256.05	4.89	1.45	1.32	1.59	<0.001	0.0481
	4	57027	3411	61455.14	5.55	1.32	1.24	1.4	<0.001	0.0304
	5	7065	677	7204.19	9.40	2.05	1.77	2.37	<0.001	0.0742
	6	66822	7094	124559.41	5.70	1.66	1.58	1.73	<0.001	0.0234
	7	3430	383	6335.45	6.05	1.5	1.24	1.8	<0.001	0.0946
	8	59340	7644	134694.90	5.68	1.45	1.39	1.51	<0.001	0.0224
	9	217	23	422.59	5.44	1.49	0.68	3.23	0.32	0.3954
	10	77415	6493	129655.38	5.01	1.43	1.37	1.5	<0.001	0.024
	Internal Reference Group	3359	192	6762.78	2.84	1.06	0.85	1.33	0.61	0.1151
COVID-19 infection (Total Count)	Control	296201	20929	604062.93	3.46	1.00 (Reference)	NA	NA	NA	NA

		1077	139	1635.24	8.50	2.93	2.07	4.15	<0.001	0.177
	2	4947	455	6288.12	7.24	2.1	1.75	2.51	<0.001	0.0917
	3	15502	1630	30256.05	5.39	1.45	1.33	1.59	<0.001	0.046
	4	57027	3666	61455.14	5.97	1.31	1.24	1.39	<0.001	0.0294
	5	7065	747	7204.19	10.37	2.13	1.85	2.45	<0.001	0.0712
	6	66822	7765	124559.41	6.23	1.66	1.58	1.73	<0.001	0.0224
	7	3430	427	6335.45	6.74	1.5	1.26	1.79	<0.001	0.0904
	8	59340	8525	134694.90	6.33	1.47	1.41	1.53	<0.001	0.0214
	9	217	26	422.59	6.15	1.41	0.67	2.96	0.36	0.3787
	10	77415	7003	129655.38	5.40	1.42	1.35	1.48	<0.001	0.0231
	Internal Reference Group	3359	221	6762.78	3.27	1.06	0.86	1.31	0.57	0.1077
Multiple COVID-19 cases	Control	296201	1562	604062.93	0.26	1.00 (Reference)	NA	NA	NA	NA
	1	1077	15	1635.24	0.92	2.71	0.96	7.62	0.06	0.5273
	2	4947	29	6288.12	0.46	1.77	0.83	3.77	0.14	0.3843
	3	15502	140	30256.05	0.46	1.44	1.05	1.98	0.02	0.1626
	4	57027	229	61455.14	0.37	1.17	0.92	1.48	0.21	0.1225
	5	7065	65	7204.19	0.90	3.08	1.81	5.22	<0.001	0.2696
	6	66822	619	124559.41	0.50	1.63	1.39	1.92	<0.001	0.083
	7	3430	42	6335.45	0.66	1.51	0.81	2.83	0.2	0.3197
	8	59340	818	134694.90	0.61	1.68	1.46	1.94	<0.001	0.0733
	9	217	<5	-	-	-	-	-	-	-
	10	77415	485	129655.38	0.37	1.19	1	1.41	0.05	0.0878

	11	3359	25	6762.78	0.37	1.07	0.57	2	0.83	0.3194
28-day CVD (Binary)	Control	296201	72	604062.93	0.01	1.00 (Reference)	NA	NA	NA	NA
	1	1077	<5	-	-	-	-	-	-	-
	2	4947	5	6288.12	0.08	8.47	0.47	151.17	0.15	1.4705
	3	15502	<5	-	-	-	-	-	-	-
	4	57027	14	61455.14	0.02	0.9	0.37	2.18	0.82	0.4519
	5	7065	10	7204.19	0.14	16.69	1.84	151.37	0.01	1.125
	6	66822	29	124559.41	0.02	4.13	1.75	9.7	<0.001	0.4363
	7	3430	<5	-	-	-	-	-	-	-
	8	59340	4	134694.90	0.00	0.72	0.11	4.84	0.74	0.9723
	9	217	<5	-	-	-	-	-	-	-
	10	77415	41	129655.38	0.03	2.62	1.24	5.56	0.01	0.3837
	Internal Reference Group	3359	<5	-	-	-	-	-	-	-
28-day CVD (Total count)	Control	296201	74	604062.93	0.01	1.00 (Reference)	NA	NA	NA	NA
	1	1077	<5	-	-	-	-	-	-	-
	2	4947	5	6288.12	0.08	8.46	0.47	151.18	0.15	1.471
	3	15502	<5	-	-	-	-	-	-	-
	4	57027	14	61455.14	0.02	0.9	0.37	2.19	0.82	0.4519
	5	7065	10	7204.19	0.14	16.68	1.84	151.29	0.01	1.1249
	6	66822	29	124559.41	0.02	4.13	1.75	9.71	<0.001	0.4363
	7	3430	<5	-	-	-	-	-	-	-

	8	59340	<5	-	-	-	-	-	-	-
	9	217	<5	-	-	-	-	-	-	-
	10	77415	41	129655.38	0.03	2.62	1.23	5.56	0.01	0.3838
	Internal Reference Group	3359	<5	-	-	-	-	-	-	-
28-day Blood clot (Binary)	Control	296201	81	604062.93	0.01	1	NA	NA	NA	NA
	1	1077	<5	-	-	-	-	-	-	-
	2	4947	<5	-	-	-	-	-	-	-
	3	15502	7	30256.05	0.02	2.34	0.29	18.83	0.42	1.0635
	4	57027	36	61455.14	0.06	2.83	1.26	6.35	0.01	0.4119
	5	7065	<5	-	-	-	-	-	-	-
	6	66822	36	124559.41	0.03	1.57	0.6	4.09	0.35	0.4878
	7	3430	<5	-	-	-	-	-	-	-
	8	59340	18	134694.90	0.01	1	0.3	3.28	1	0.607
	9	217	<5	-	-	-	-	-	-	-
	10	77415	36	129655.38	0.03	1.24	0.55	2.82	0.6	0.4166
	Internal Reference Group	3359	<5	-	-	-	-	-	-	-
28-day Blood clot (Total Count)	Control	296201	81	604062.93	0.01	1.00 (Reference)	NA	NA	NA	NA
	1	1077	<5	-	-	-	-	-	-	-
	2	4947	<5	-	-	-	-	-	-	-
	3	15502	7	30256.05	0.02	2.34	0.29	18.83	0.42	1.0635

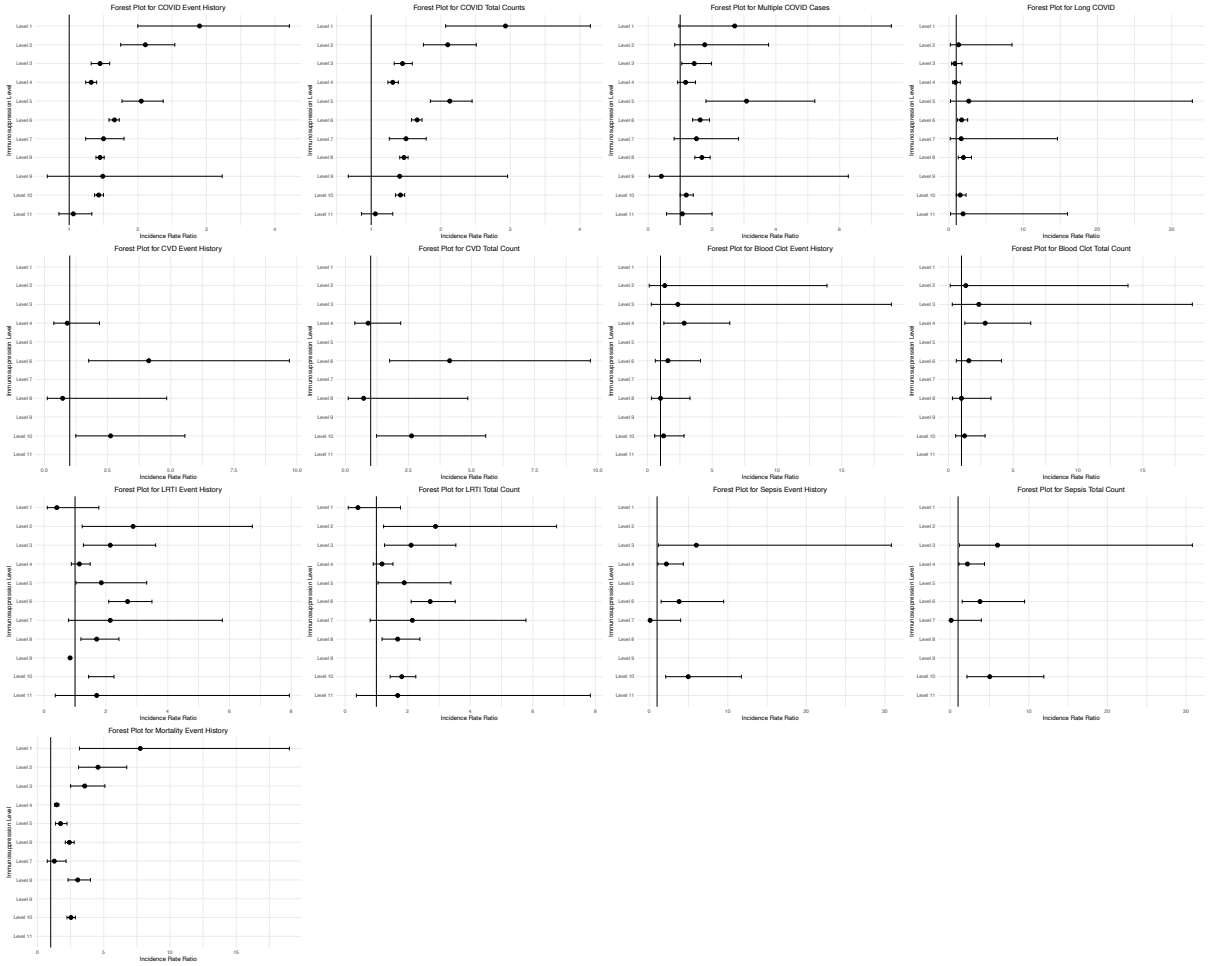
	4	57027	36	61455.14	0.06	2.83	1.26	6.35	0.01	0.4119
	5	7065	<5	-	-	-	-	-	-	-
	6	66822	36	124559.41	0.03	1.57	0.6	4.09	0.35	0.4878
	7	3430	<5	-	-	-	-	-	-	-
	8	59340	18	134694.90	0.01	1	0.3	3.28	1	0.607
	9	217	<5	-	-	-	-	-	-	-
	10	77415	36	129655.38	0.03	1.24	0.55	2.82	0.6	0.4166
	Internal Reference Group	3359	<5	-	-	-	-	-	-	-
28-day LRTI (Binary)	Control	296201	711	604062.93	0.12	1.00 (Reference)	NA	NA	NA	NA
	1	1077	<5	-	-	-	-	-	-	-
	2	4947	28	6288.12	0.45	2.88	1.23	6.74	0.01	0.4339
	3	15502	65	30256.05	0.21	2.14	1.27	3.61	<0.001	0.2671
	4	57027	216	61455.14	0.35	1.14	0.88	1.49	0.32	0.135
	5	7065	46	7204.19	0.64	1.85	1.03	3.32	0.04	0.2995
	6	66822	349	124559.41	0.28	2.7	2.09	3.49	<0.001	0.1309
	7	3430	18	6335.45	0.28	2.14	0.79	5.77	0.13	0.5062
	8	59340	144	134694.90	0.11	1.7	1.19	2.42	<0.001	0.181
	9	217	<5	-	-	-	-	-	-	-
	10	77415	390	129655.38	0.30	1.8	1.44	2.26	<0.001	0.1151
	Internal Reference Group	3359	5	6762.78	0.07	1.7	0.36	7.94	0.5	0.7863

28-day LRTI (Total Count)	Control	296201	717	604062.93	0.12	1.00 (Reference)	NA	NA	NA	NA
	1	1077	<5	-	-	-	-	-	-	-
	2	4947	28	6288.12	0.45	2.89	1.23	6.76	0.01	0.4339
	3	15502	65	30256.05	0.21	2.11	1.26	3.54	<0.001	0.2646
	4	57027	220	61455.14	0.36	1.18	0.9	1.53	0.23	0.1344
	5	7065	47	7204.19	0.65	1.89	1.05	3.38	0.03	0.2976
	6	66822	350	124559.41	0.28	2.72	2.11	3.52	<0.001	0.1305
	7	3430	19	6335.45	0.30	2.15	0.8	5.78	0.13	0.5052
	8	59340	145	134694.90	0.11	1.68	1.18	2.39	<0.001	0.1796
	9	217	<5	-	-	-	-	-	-	-
	10	77415	392	129655.38	0.30	1.81	1.44	2.26	<0.001	0.1147
	Internal Reference Group	3359	5	6762.78	0.07	1.68	0.36	7.84	0.51	0.7873
28-day Sepsis (Binary)	Control	296201	63	604062.93	0.01	1.00 (Reference)	NA	NA	NA	NA
	1	1077	<5	-	-	-	-	-	-	-
	2	4947	18	6288.12	0.29	1000824.23	0	3.32E+133	0.93	149.8097
	3	15502	11	30256.05	0.04	6	1.17	30.83	0.03	0.8346
	4	57027	42	61455.14	0.07	2.18	1.1	4.34	0.03	0.3503
	5	7065	11	7204.19	0.15	5.89	0.53	65.92	0.15	1.2318
	6	66822	39	124559.41	0.03	3.8	1.52	9.48	<0.001	0.4666
	7	3430	<5	-	-	-	-	-	-	-
	8	59340	10	134694.90	0.01	15.59	1.43	169.78	0.02	1.2184

	9	217	<5	-	-	-	-	-	-	-
	10	77415	46	129655.38	0.04	4.97	2.1	11.74	<0.001	0.4384
	Internal Reference Group	3359	<5	-	-	-	-	-	-	-
28-day Sepsis (Total Count)	Control	296201	63	604062.93	0.01	1.00 (Reference)	NA	NA	NA	NA
	1	1077	<5	-	-	-	-	-	-	-
	2	4947	18	6288.12	0.29	1023804.82	0	1.50E+133	0.93	149.3918
	3	15502	11	30256.05	0.04	6.02	1.18	30.8	0.03	0.8332
	4	57027	43	61455.14	0.07	2.19	1.11	4.36	0.02	0.3498
	5	7065	12	7204.19	0.17	7.06	0.63	79.15	0.11	1.2335
	6	66822	40	124559.41	0.03	3.79	1.52	9.46	<0.001	0.4662
	7	3430	<5	-	-	-	-	-	-	-
	8	59340	10	134694.90	0.01	15.8	1.47	170.08	0.02	1.2124
	9	217	<5	-	-	-	-	-	-	-
	10	77415	46	129655.38	0.04	5.03	2.13	11.91	<0.001	0.4396
	Internal Reference Group	3359	<5	-	-	-	-	-	-	-
Long COVID	Control	296201	256	604062.93	0.04	1.00 (Reference)	NA	NA	NA	NA
	1	1077	<5	-	-	-	-	-	-	-
	2	4947	6	6288.12	0.10	1.32	0.21	8.51	0.77	0.9498
	3	15502	22	30256.05	0.07	0.81	0.37	1.77	0.59	0.4006
	4	57027	35	61455.14	0.06	0.9	0.52	1.54	0.69	0.2769
	5	7065	<5	-	-	-	-	-	-	-

	6	66822	130	124559.41	0.10	1.73	1.18	2.54	0.01	0.196
	7	3430	<5	-	-	-	-	-	-	-
	8	59340	100	134694.90	0.07	1.97	1.27	3.05	<0.001	0.2228
	9	217	<5	-	-	-	-	-	-	-
	10	77415	96	129655.38	0.07	1.53	1.01	2.32	0.05	0.2131
	Internal Reference Group	3359	<5	-	-	-	-	-	-	-
Mortality	Control	296201	2413	604062.93	0.40	1.00 (Reference)	NA	NA	NA	NA
	1	1077	35	1635.24	2.14	7.76	3.17	19.01	<0.001	0.457
	2	4947	119	6288.12	1.89	4.57	3.1	6.74	<0.001	0.1977
	3	15502	130	30256.05	0.43	3.57	2.5	5.09	<0.001	0.1816
	4	57027	1011	61455.14	1.65	1.45	1.29	1.62	<0.001	0.0578
	5	7065	236	7204.19	3.28	1.74	1.36	2.23	<0.001	0.1262
	6	66822	888	124559.41	0.71	2.41	2.1	2.77	<0.001	0.0707
	7	3430	42	6335.45	0.66	1.27	0.74	2.16	0.39	0.2727
	8	59340	247	134694.90	0.18	3.04	2.31	4	<0.001	0.1403
	9	217	<5	-	-	-	-	-	-	-
	10	77415	1209	129655.38	0.93	2.53	2.23	2.86	<0.001	0.0629
	Internal Reference Group	3359	5	6762.78	0.07	14.75	1.5	144.88	0.02	1.1655

Summary Forest Plot of Subgroup Analysis of Age-Sex Matched & Fully Adjusted Cohort by Vaccine Uptake, Unvaccinated



Subgroup Analysis of Age-Sex Matched & Fully Adjusted Cohort by Vaccine Uptake, <5 doses

Outcome of Interest	Phenotype Level	Sample Size	Events	Person years	Incidence Rate per 100 person years	Incidence Rate Ratio	LCI	UCI	*p-value*	Non-Robust SE
COVID-19 infection (Binary)	Control	1087964	246834	3404007.74	7.25	1.00 (Reference)	NA	NA	NA	NA
	1	3320	1028	9240.43	11.13	1.6	1.44	1.76	<0.001	0.0512
	2	12202	2663	29436.50	9.05	1.41	1.32	1.5	<0.001	0.0312
	3	46533	10633	133862.16	7.94	1.04	1.01	1.07	0.01	0.0145
	4	175763	30172	429565.82	7.02	1.07	1.04	1.09	<0.001	0.0087
	5	15157	3346	35666.99	9.38	1.44	1.36	1.52	<0.001	0.0282
	6	299266	71060	884068.05	8.04	1.08	1.07	1.09	<0.001	0.0058
	7	11367	2698	33968.17	7.94	1.06	1	1.12	0.05	0.0293
	8	227550	59888	693617.24	8.63	1.02	1.01	1.03	<0.001	0.0062
	9	1210	284	3287.33	8.64	0.95	0.8	1.13	0.55	0.0873
	10	288697	52522	816233.83	6.43	0.97	0.95	0.98	<0.001	0.0066
	Internal Reference Group	6899	1387	19569.40	7.09	1.01	0.94	1.09	0.71	0.0384
COVID-19 infection (Total Count)	Control	1087964	268586	3404007.74	7.89	1.00 (Reference)	NA	NA	NA	NA
		3320	1212	9240.43	13.12	1.71	1.56	1.88	<0.001	0.0482
	2	12202	3024	29436.50	10.27	1.46	1.38	1.55	<0.001	0.0295
	3	46533	11857	133862.16	8.86	1.06	1.03	1.09	<0.001	0.0138
	4	175763	32849	429565.82	7.65	1.07	1.06	1.09	<0.001	0.0083

	5	15157	3904	35666.99	10.95	1.53	1.45	1.61	<0.001	0.0266
	6	299266	78353	884068.05	8.86	1.09	1.08	1.11	<0.001	0.0055
	7	11367	3006	33968.17	8.85	1.07	1.02	1.13	0.01	0.0278
	8	227550	66156	693617.24	9.54	1.02	1.01	1.04	<0.001	0.0059
	9	1210	321	3287.33	9.76	0.97	0.82	1.14	0.69	0.0825
	10	288697	57565	816233.83	7.05	0.97	0.96	0.98	<0.001	0.0064
	Internal Reference Group	6899	1560	19569.40	7.97	1.05	0.97	1.12	0.22	0.0365
Multiple COVID-19 cases	Control	1087964	20167	3404007.74	0.59	1.00 (Reference)	NA	NA	NA	NA
	1	3320	152	9240.43	1.64	2.62	1.92	3.57	<0.001	0.1587
	2	12202	307	29436.50	1.04	1.85	1.52	2.25	<0.001	0.101
	3	46533	1117	133862.16	0.83	1.2	1.09	1.32	<0.001	0.0473
	4	175763	2454	429565.82	0.57	1.06	1	1.12	0.07	0.0307
	5	15157	470	35666.99	1.32	2.25	1.89	2.68	<0.001	0.0886
	6	299266	6610	884068.05	0.75	1.24	1.2	1.29	<0.001	0.0199
	7	11367	271	33968.17	0.80	1.19	0.99	1.44	0.07	0.0966
	8	227550	5763	693617.24	0.83	1.06	1.02	1.1	<0.001	0.0208
	9	1210	31	3287.33	0.94	1.09	0.64	1.85	0.76	0.2726
	10	288697	4627	816233.83	0.57	1.03	0.99	1.08	0.15	0.0232
	11	6899	155	19569.40	0.79	1.29	1	1.65	0.05	0.126
Breakthrough infection within 3 months of vaccination(Binary)	0	1087964	84221	3404007.74	2.47	1.00 (Reference)	NA	NA	NA	NA

	1	3320	328	9240.43	3.55	1.41	1.19	1.68	<0.001	0.0876
	2	12202	811	29436.50	2.76	1.28	1.15	1.43	<0.001	0.0554
	3	46533	3348	133862.16	2.50	0.98	0.93	1.03	0.33	0.0254
	4	175763	9234	429565.82	2.15	1	0.97	1.03	0.93	0.0155
	5	15157	869	35666.99	2.44	1.24	1.12	1.38	<0.001	0.0531
	6	299266	23459	884068.05	2.65	1.04	1.02	1.06	<0.001	0.01
	7	11367	851	33968.17	2.51	1.05	0.95	1.16	0.35	0.0515
	8	227550	20618	693617.24	2.97	1.01	0.99	1.03	0.48	0.0106
	9	1210	99	3287.33	3.01	0.97	0.73	1.3	0.85	0.1489
	10	288697	14988	816233.83	1.84	0.89	0.87	0.91	<0.001	0.0121
	Internal Reference Group	6899	435	19569.40	2.22	1.04	0.91	1.19	0.52	0.0682
Breakthrough infection within 3 months of vaccination (Total Count)	Control	1087964	85615	3404007.74	2.52	1.00 (Reference)	NA	NA	NA	NA
	1	3320	334	9240.43	3.61	1.42	1.2	1.68	<0.001	0.0868
	2	12202	826	29436.50	2.81	1.29	1.16	1.44	<0.001	0.0549
	3	46533	3409	133862.16	2.55	0.98	0.93	1.03	0.35	0.0252
	4	175763	9367	429565.82	2.18	1	0.97	1.03	0.81	0.0154
	5	15157	888	35666.99	2.49	1.24	1.12	1.38	<0.001	0.0526
	6	299266	23916	884068.05	2.71	1.04	1.02	1.07	<0.001	0.0099
	7	11367	865	33968.17	2.55	1.04	0.94	1.15	0.48	0.051
	8	227550	21034	693617.24	3.03	1.01	0.99	1.03	0.39	0.0105

	9	1210	101	3287.33	3.07	0.95	0.72	1.27	0.75	0.147
	10	288697	15256	816233.83	1.87	0.89	0.87	0.92	<0.001	0.012
	Internal Reference Group	6899	445	19569.40	2.27	1.05	0.92	1.2	0.46	0.0676
Breakthrough infection between 4 and 6 months of vaccination (Binary)	Control	1087964	76424	3404007.74	2.25	1.00 (Reference)	NA	NA	NA	NA
	1	3320	297	9240.43	3.21	1.56	1.3	1.88	<0.001	0.094
	2	12202	743	29436.50	2.52	1.31	1.17	1.47	<0.001	0.0585
	3	46533	3022	133862.16	2.26	1.01	0.96	1.07	0.68	0.0269
	4	175763	8940	429565.82	2.08	1.06	1.03	1.09	<0.001	0.0159
	5	15157	856	35666.99	2.40	1.32	1.18	1.46	<0.001	0.0545
	6	299266	21098	884068.05	2.39	1.04	1.02	1.06	<0.001	0.0105
	7	11367	754	33968.17	2.22	0.97	0.87	1.08	0.57	0.0541
	8	227550	18255	693617.24	2.63	1	0.98	1.02	0.87	0.0112
	9	1210	82	3287.33	2.49	1.02	0.74	1.4	0.91	0.164
	10	288697	13213	816233.83	1.62	0.87	0.85	0.89	<0.001	0.0127
	Internal Reference Group	6899	351	19569.40	1.79	0.9	0.78	1.04	0.17	0.0732
Breakthrough infection between 4 and 6 months of vaccination (Total Count)	Control	1087964	77370	3404007.74	2.27	1.00 (Reference)	NA	NA	NA	NA
	1	3320	309	9240.43	3.34	1.61	1.34	1.93	<0.001	0.0928

	2	12202	759	29436.50	2.58	1.32	1.18	1.48	<0.001	0.0581
	3	46533	3081	133862.16	2.30	1.02	0.97	1.07	0.49	0.0267
	4	175763	9104	429565.82	2.12	1.07	1.03	1.1	<0.001	0.0158
	5	15157	882	35666.99	2.47	1.34	1.2	1.49	<0.001	0.0539
	6	299266	21428	884068.05	2.42	1.04	1.02	1.06	<0.001	0.0105
	7	11367	763	33968.17	2.25	0.98	0.88	1.09	0.66	0.0538
	8	227550	18482	693617.24	2.66	1	0.98	1.02	0.78	0.0112
	9	1210	83	3287.33	2.52	1	0.73	1.38	0.98	0.1625
	10	288697	13394	816233.83	1.64	0.87	0.85	0.89	<0.001	0.0126
	Internal Reference Group	6899	361	19569.40	1.84	0.92	0.79	1.06	0.22	0.0724
28-day CVD (Binary)	Control	1087964	328	3404007.74	0.01	1.00 (Reference)	NA	NA	NA	NA
	1	3320	8	9240.43	0.09	4.87	0.91	25.92	0.06	0.8534
	2	12202	10	29436.50	0.03	6.42	1.59	25.95	0.01	0.7122
	3	46533	17	133862.16	0.01	2.27	0.91	5.66	0.08	0.4671
	4	175763	86	429565.82	0.02	1.06	0.75	1.51	0.74	0.1785
	5	15157	27	35666.99	0.08	2.81	1.27	6.24	0.01	0.4065
	6	299266	126	884068.05	0.01	1.68	1.22	2.31	<0.001	0.163
	7	11367	8	33968.17	0.02	2.04	0.54	7.65	0.29	0.6743
	8	227550	70	693617.24	0.01	2.79	1.71	4.55	<0.001	0.2496
	9	1210	<5	-	-	-	-	-	-	-
	10	288697	225	816233.83	0.03	3.17	2.37	4.24	<0.001	0.1485

	Internal Reference Group	6899	<5	-	-	-	-	-	-	-
28-day CVD (Total count)	Control	1087964	332	3404007.74	0.01	1.00 (Reference)	NA	NA	NA	NA
	1	3320	8	9240.43	0.09	4.84	0.91	25.8	0.06	0.8541
	2	12202	10	29436.50	0.03	6.33	1.58	25.45	0.01	0.7096
	3	46533	17	133862.16	0.01	2.27	0.91	5.66	0.08	0.467
	4	175763	86	429565.82	0.02	1.03	0.73	1.46	0.85	0.1774
	5	15157	28	35666.99	0.08	2.59	1.2	5.6	0.02	0.3928
	6	299266	126	884068.05	0.01	1.65	1.2	2.27	0	0.1623
	7	11367	9	33968.17	0.03	2.35	0.65	8.52	0.19	0.6579
	8	227550	70	693617.24	0.01	2.8	1.72	4.56	<0.001	0.2496
	9	1210	<5	-	-	-	-	-	-	-
	10	288697	226	816233.83	0.03	3.18	2.38	4.26	<0.001	0.1483
	Internal Reference Group	6899	<5	-	-	-	-	-	-	-
28-day Blood clot (Binary)	Control	1087964	380	3404007.74	0.01	1.00 (Reference)	NA	NA	NA	NA
	1	3320	5	9240.43	0.05	34478.78	0	1.09E+81	0.91	89.8703
	2	12202	14	29436.50	0.05	5.06	1.55	16.57	0.01	0.605
	3	46533	34	133862.16	0.03	4.69	2.17	10.15	<0.001	0.3937
	4	175763	164	429565.82	0.04	4.2	3.07	5.73	<0.001	0.1593
	5	15157	20	35666.99	0.06	9.56	2.12	43.11	<0.001	0.7686
	6	299266	218	884068.05	0.02	2.28	1.74	2.98	<0.001	0.1365

	7	11367	10	33968.17	0.03	0.99	0.32	3.03	0.98	0.5722
	8	227550	57	693617.24	0.01	1.07	0.7	1.62	0.76	0.2132
	9	1210	<5	-	-	-	-	-	-	-
	10	288697	177	816233.83	0.02	1.62	1.22	2.15	<0.001	0.1452
	Internal Reference Group	6899	<5	-	-	-	-	-	-	-
28-day Blood clot (Total Count)	Control	1087964	383	3404007.74	0.01	1.00 (Reference)	NA	NA	NA	NA
	1	3320	5	9240.43	0.05	33507.42	0	1.07E+81	0.91	89.8753
	2	12202	14	29436.50	0.05	5.05	1.54	16.54	0.01	0.6055
	3	46533	34	133862.16	0.03	4.69	2.17	10.16	<0.001	0.3938
	4	175763	166	429565.82	0.04	4.1	3.01	5.59	<0.001	0.1581
	5	15157	20	35666.99	0.06	9.59	2.13	43.15	<0.001	0.7674
	6	299266	218	884068.05	0.02	2.28	1.75	2.98	<0.001	0.1365
	7	11367	11	33968.17	0.03	1.1	0.37	3.3	0.86	0.5591
	8	227550	57	693617.24	0.01	1.07	0.7	1.62	0.76	0.2132
	9	1210	<5	-	-	-	-	-	-	-
	10	288697	180	816233.83	0.02	1.66	1.25	2.2	<0.001	0.1446
	Internal Reference Group	6899	<5	-	-	-	-	-	-	-
28-day LRTI (Binary)	Control	1087964	3788	3404007.74	0.11	1.00 (Reference)	NA	NA	NA	NA
	1	3320	53	9240.43	0.57	8.03	3.47	18.57	<0.001	0.4277
	2	12202	147	29436.50	0.50	3.67	2.59	5.19	<0.001	0.1771

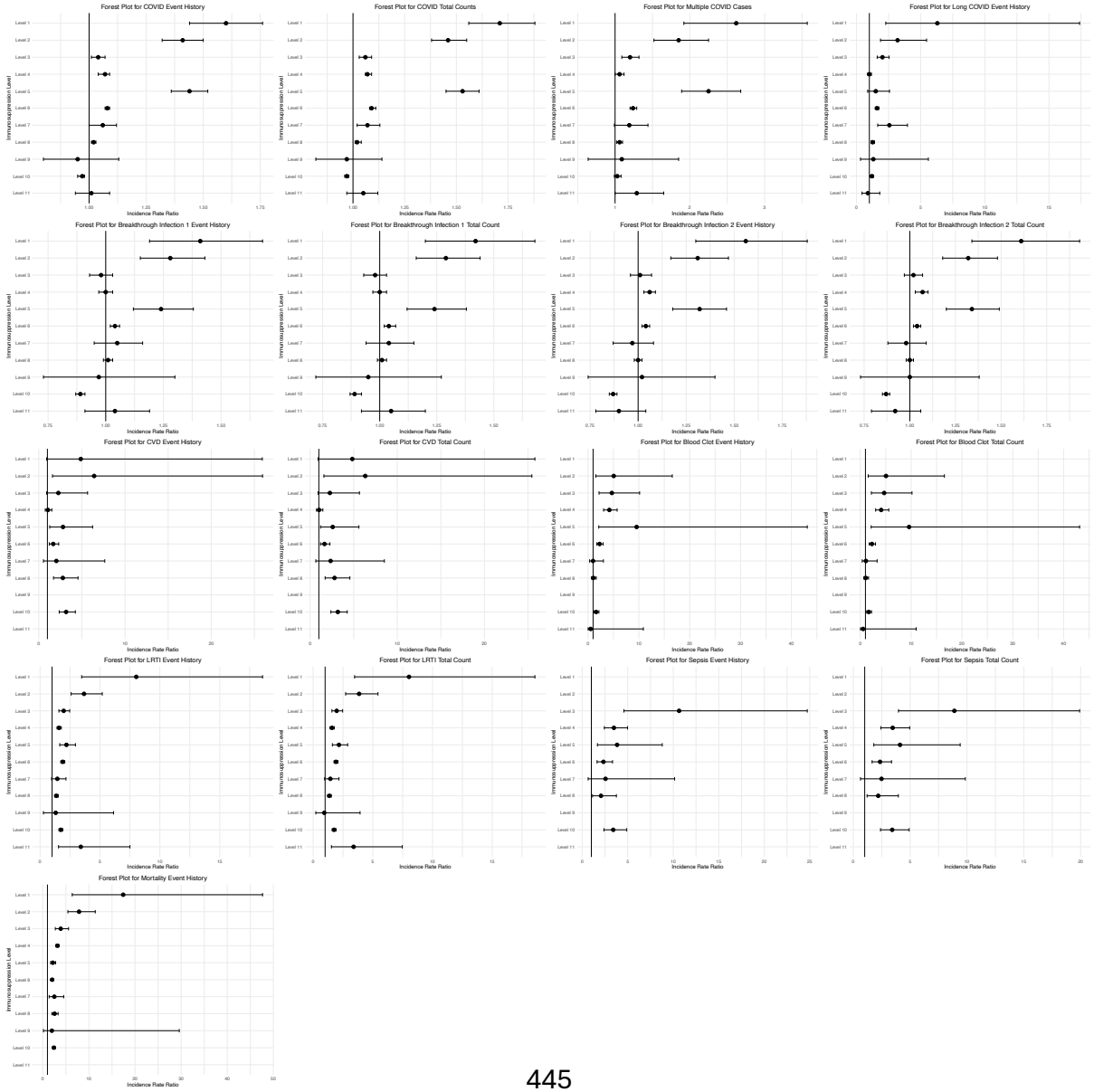
	3	46533	274	133862.16	0.20	1.97	1.57	2.47	<0.001	0.1154
	4	175763	1003	429565.82	0.23	1.58	1.42	1.77	<0.001	0.0561
	5	15157	182	35666.99	0.51	2.2	1.64	2.95	<0.001	0.1493
	6	299266	1865	884068.05	0.21	1.89	1.73	2.06	<0.001	0.0446
	7	11367	76	33968.17	0.22	1.44	0.96	2.16	0.08	0.2058
	8	227550	916	693617.24	0.13	1.36	1.21	1.52	<0.001	0.0579
	9	1210	<5	-	-	-	-	-	-	-
	10	288697	1814	816233.83	0.22	1.73	1.58	1.89	<0.001	0.0459
	Internal Reference Group	6899	27	19569.40	0.14	3.4	1.54	7.5	<0.001	0.404
28-day LRTI (Total Count)	Control	1087964	3817	3404007.74	0.11	1.00 (Reference)	NA	NA	NA	NA
	1	3320	53	9240.43	0.57	8.03	3.47	18.58	<0.001	0.4278
	2	12202	152	29436.50	0.52	3.85	2.72	5.43	<0.001	0.1761
	3	46533	277	133862.16	0.21	1.97	1.57	2.47	<0.001	0.115
	4	175763	1016	429565.82	0.24	1.58	1.42	1.77	<0.001	0.0558
	5	15157	183	35666.99	0.51	2.16	1.61	2.89	<0.001	0.1488
	6	299266	1884	884068.05	0.21	1.91	1.75	2.08	<0.001	0.0444
	7	11367	77	33968.17	0.23	1.44	0.96	2.16	0.07	0.2059
	8	227550	927	693617.24	0.13	1.36	1.21	1.52	<0.001	0.0575
	9	1210	<5	-	-	-	-	-	-	-
	10	288697	1847	816233.83	0.23	1.75	1.6	1.92	<0.001	0.0456
	Internal Reference Group	6899	27	19569.40	0.14	3.39	1.53	7.47	<0.001	0.4039

28-day Sepsis (Binary)	Control	1087964	239	3404007.74	0.01	1.00 (Reference)	NA	NA	NA	NA
	1	3320	16	9240.43	0.17	186547.91	0	7.90E+71	0.88	78.2724
	2	12202	48	29436.50	0.16	218.63	24.85	1923.85	<0.001	1.1095
	3	46533	45	133862.16	0.03	10.64	4.58	24.72	<0.001	0.43
	4	175763	139	429565.82	0.03	3.48	2.43	4.98	<0.001	0.1831
	5	15157	31	35666.99	0.09	3.83	1.67	8.79	<0.001	0.4236
	6	299266	126	884068.05	0.01	2.33	1.63	3.33	<0.001	0.1821
	7	11367	9	33968.17	0.03	2.56	0.65	10.15	0.18	0.7028
	8	227550	41	693617.24	0.01	2.06	1.13	3.75	0.02	0.3057
	9	1210	<5	-	-	-	-	-	-	-
	10	288697	153	816233.83	0.02	3.41	2.38	4.89	<0.001	0.1836
	Internal Reference Group	6899	<5	-	-	-	-	-	-	-
28-day Sepsis (Total Count)	Control	1087964	240	3404007.74	0.01	1.00 (Reference)	NA	NA	NA	NA
	1	3320	17	9240.43	0.18	177542.06	0	7.62E+69	0.87	75.9298
	2	12202	51	29436.50	0.17	240.7	27.31	2121.33	<0.001	1.1103
	3	46533	45	133862.16	0.03	8.89	3.97	19.91	<0.001	0.4114
	4	175763	139	429565.82	0.03	3.46	2.42	4.96	<0.001	0.1832
	5	15157	32	35666.99	0.09	4.11	1.8	9.4	<0.001	0.4223
	6	299266	127	884068.05	0.01	2.35	1.65	3.36	<0.001	0.182
	7	11367	9	33968.17	0.03	2.48	0.63	9.85	0.2	0.7026
	8	227550	44	693617.24	0.01	2.19	1.21	3.96	0.01	0.3023

	9	1210	<5	-	-	-	-	-	-	-
	10	288697	154	816233.83	0.02	3.42	2.39	4.91	<0.001	0.1835
	Internal Reference Group	6899	<5	-	-	-	-	-	-	-
Long COVID	Control	1087964	3274	3404007.74	0.10	1.00 (Reference)	NA	NA	NA	NA
	1	3320	23	9240.43	0.25	6.3	2.28	17.39	<0.001	0.518
	2	12202	54	29436.50	0.18	3.2	1.87	5.46	<0.001	0.2733
	3	46533	235	133862.16	0.18	2.02	1.61	2.54	<0.001	0.1163
	4	175763	428	429565.82	0.10	1	0.87	1.16	0.97	0.0731
	5	15157	38	35666.99	0.11	1.5	0.87	2.57	0.15	0.2761
	6	299266	1382	884068.05	0.16	1.6	1.46	1.75	<0.001	0.0468
	7	11367	72	33968.17	0.21	2.56	1.65	3.97	<0.001	0.224
	8	227550	928	693617.24	0.13	1.26	1.13	1.4	<0.001	0.0539
	9	1210	6	3287.33	0.18	1.31	0.31	5.6	0.72	0.7415
	10	288697	920	816233.83	0.11	1.2	1.07	1.33	<0.001	0.0547
	Internal Reference Group	6899	19	19569.40	0.10	0.88	0.43	1.81	0.74	0.366
Mortality	Control	1087964	2392	3404007.74	0.07	1.00 (Reference)	NA	NA	NA	NA
	1	3320	42	9240.43	0.45	17.43	6.37	47.66	<0.001	0.5133
	2	12202	191	29436.50	0.65	7.85	5.43	11.37	<0.001	0.1886
	3	46533	138	133862.16	0.10	3.88	2.7	5.58	<0.001	0.1849
	4	175763	1386	429565.82	0.32	3.16	2.84	3.51	<0.001	0.0544
	5	15157	229	35666.99	0.64	2.17	1.7	2.77	<0.001	0.1242

	6	299266	891	884068.05	0.10	2.01	1.77	2.28	<0.001	0.0637
	7	11367	45	33968.17	0.13	2.49	1.37	4.53	<0.001	0.3046
	8	227550	220	693617.24	0.03	2.55	1.96	3.31	<0.001	0.1337
	9	1210	<5	-	-	-	-	-	-	-
	10	288697	1030	816233.83	0.13	2.39	2.12	2.69	<0.001	0.0606
	Internal Reference Group	6899	6	19569.40	0.03	61.76	3.79	1007.36	<0.001	1.4244

Summary Forest Plot of Subgroup Analysis of Age-Sex Matched & Fully Adjusted Cohort by Vaccine Uptake, <5 doses



Subgroup Analysis of Age-Sex Matched & Fully Adjusted Cohort by Vaccine Uptake, >5 doses

Outcome of Interest	Phenotype Level	Sample Size	Events	Person years	Incidence Rate per 100 person years	Incidence Rate Ratio	LCI	UCI	*p-value*	Non-Robust SE
COVID-19 infection (Binary)	Control	932217	184457	3234792.88	5.70	1.00 (Reference)	NA	NA	NA	NA
	1	4719	2090	16496.06	12.67	1.69	1.57	1.81	<0.001	0.0371
	2	21726	6098	70001.80	8.71	1.58	1.52	1.65	<0.001	0.0211
	3	26105	6551	86496.76	7.57	1.21	1.16	1.25	<0.001	0.019
	4	236523	42088	747615.17	5.63	1.14	1.13	1.16	<0.001	0.0073
	5	15901	3717	47675.87	7.80	1.47	1.39	1.55	<0.001	0.0264
	6	267765	60983	923032.86	6.61	1.13	1.12	1.15	<0.001	0.0062
	7	9496	2063	32501.34	6.35	1.1	1.03	1.18	<0.001	0.0331
	8	88481	20843	305623.24	6.82	1.03	1.01	1.05	<0.001	0.0103
	9	696	131	2141.39	6.12	0.95	0.74	1.21	0.67	0.124
	10	257125	47375	854589.68	5.54	0.98	0.97	0.99	0.01	0.0069
	Internal Reference Group	3680	1152	12328.79	9.34	1.15	1.06	1.26	<0.001	0.0446
COVID-19 infection (Total Count)	Control	932217	200664	3234792.88	6.20	1.00 (Reference)	NA	NA	NA	NA
		4719	2489	16496.06	15.09	1.81	1.69	1.94	<0.001	0.0348
	2	21726	6865	70001.80	9.81	1.63	1.57	1.7	<0.001	0.02
	3	26105	7348	86496.76	8.50	1.23	1.19	1.28	<0.001	0.0181
	4	236523	45539	747615.17	6.09	1.15	1.13	1.16	<0.001	0.0071
	5	15901	4343	47675.87	9.11	1.56	1.48	1.63	<0.001	0.0248

	6	267765	67865	923032.86	7.35	1.16	1.14	1.17	<0.001	0.0059
	7	9496	2297	32501.34	7.07	1.12	1.05	1.19	<0.001	0.0315
	8	88481	23069	305623.24	7.55	1.03	1.01	1.05	<0.001	0.0098
	9	696	150	2141.39	7.00	0.99	0.78	1.24	0.91	0.1171
	10	257125	51688	854589.68	6.05	0.99	0.97	1	0.05	0.0066
	Internal Reference Group	3680	1300	12328.79	10.54	1.18	1.09	1.28	<0.001	0.0423
Multiple COVID-19 cases	Control	932217	14934	3234792.88	0.46	1.00 (Reference)	NA	NA	NA	NA
	1	4719	350	16496.06	2.12	2.8	2.27	3.47	<0.001	0.1086
	2	21726	665	70001.80	0.95	2.01	1.75	2.3	<0.001	0.069
	3	26105	713	86496.76	0.82	1.47	1.3	1.66	<0.001	0.0614
	4	236523	3215	747615.17	0.43	1.19	1.13	1.26	<0.001	0.027
	5	15901	556	47675.87	1.17	2.32	1.98	2.71	<0.001	0.0793
	6	267765	6223	923032.86	0.67	1.39	1.33	1.44	<0.001	0.0206
	7	9496	209	32501.34	0.64	1.27	1.03	1.58	0.03	0.1089
	8	88481	2019	305623.24	0.66	1.07	1	1.14	0.04	0.0337
	9	696	18	2141.39	0.84	1.38	0.67	2.83	0.38	0.3658
	10	257125	3949	854589.68	0.46	1.04	0.99	1.09	0.1	0.0244
	11	3680	137	12328.79	1.11	1.49	1.13	1.96	<0.001	0.1403
Breakthrough infection within 3 months of vaccination(Binary)	0	932217	66176	3234792.88	2.05	1.00 (Reference)	NA	NA	NA	NA
	1	4719	1210	16496.06	7.34	2.81	2.51	3.15	<0.001	0.0576
	2	21726	3121	70001.80	4.46	2.32	2.18	2.48	<0.001	0.0331
	3	26105	2683	86496.76	3.10	1.35	1.27	1.44	<0.001	0.0306

	4	236523	15870	747615.17	2.12	1.23	1.21	1.26	<0.001	0.0122
	5	15901	1530	47675.87	3.21	1.57	1.45	1.71	<0.001	0.0419
	6	267765	24706	923032.86	2.68	1.28	1.26	1.31	<0.001	0.01
	7	9496	801	32501.34	2.46	1.12	1.01	1.25	0.03	0.0535
	8	88481	7998	305623.24	2.62	1.1	1.06	1.14	<0.001	0.0169
	9	696	44	2141.39	2.05	0.81	0.54	1.21	0.3	0.2068
	10	257125	16778	854589.68	1.96	0.99	0.96	1.01	0.25	0.0115
	Internal Reference Group	3680	511	12328.79	4.14	1.37	1.19	1.57	<0.001	0.0699
Breakthrough infection within 3 months of vaccination (Total Count)	Control	932217	67855	3234792.88	2.10	1.00 (Reference)	NA	NA	NA	NA
	1	4719	1310	16496.06	7.94	2.94	2.64	3.29	<0.001	0.0563
	2	21726	3329	70001.80	4.76	2.42	2.27	2.58	<0.001	0.0325
	3	26105	2804	86496.76	3.24	1.37	1.29	1.45	<0.001	0.0301
	4	236523	16272	747615.17	2.18	1.24	1.21	1.27	<0.001	0.012
	5	15901	1639	47675.87	3.44	1.64	1.51	1.77	<0.001	0.0409
	6	267765	25698	923032.86	2.78	1.3	1.28	1.33	<0.001	0.0099
	7	9496	838	32501.34	2.58	1.15	1.04	1.27	0.01	0.0526
	8	88481	8256	305623.24	2.70	1.1	1.07	1.14	<0.001	0.0167
	9	696	45	2141.39	2.10	0.8	0.54	1.19	0.27	0.2038
	10	257125	17182	854589.68	2.01	0.99	0.97	1.01	0.31	0.0114
	Internal Reference Group	3680	535	12328.79	4.34	1.39	1.21	1.59	<0.001	0.0686

Breakthrough infection between 4 and 6 months of vaccination (Binary)	Control	932217	76398	3234792.88	2.36	1.00 (Reference)	NA	NA	NA	NA
	1	4719	754	16496.06	4.57	1.46	1.3	1.64	<0.001	0.0595
	2	21726	2416	70001.80	3.45	1.48	1.38	1.57	<0.001	0.0329
	3	26105	2583	86496.76	2.99	1.22	1.15	1.3	<0.001	0.0304
	4	236523	18407	747615.17	2.46	1.17	1.15	1.2	<0.001	0.0112
	5	15901	1599	47675.87	3.35	1.54	1.42	1.67	<0.001	0.0405
	6	267765	25098	923032.86	2.72	1.13	1.11	1.15	<0.001	0.0096
	7	9496	851	32501.34	2.62	1.13	1.02	1.25	0.02	0.0519
	8	88481	8396	305623.24	2.75	1.04	1	1.07	0.03	0.0162
	9	696	62	2141.39	2.90	1.27	0.87	1.84	0.22	0.1911
	10	257125	18480	854589.68	2.16	0.97	0.95	0.99	0.01	0.0109
	Internal Reference Group	3680	442	12328.79	3.59	1.29	1.12	1.48	<0.001	0.0728
Breakthrough infection between 4 and 6 months of vaccination (Total Count)	Control	932217	78240	3234792.88	2.42	1.00 (Reference)	NA	NA	NA	NA
	1	4719	790	16496.06	4.79	1.49	1.32	1.67	<0.001	0.0585
	2	21726	2515	70001.80	3.59	1.5	1.41	1.6	<0.001	0.0323
	3	26105	2686	86496.76	3.11	1.23	1.16	1.3	<0.001	0.0298
	4	236523	18907	747615.17	2.53	1.18	1.15	1.2	<0.001	0.011
	5	15901	1675	47675.87	3.51	1.57	1.46	1.7	<0.001	0.0398
	6	267765	25974	923032.86	2.81	1.14	1.12	1.16	<0.001	0.0095
	7	9496	874	32501.34	2.69	1.13	1.02	1.25	0.02	0.0512
	8	88481	8645	305623.24	2.83	1.04	1.01	1.07	0.02	0.016

	9	696	65	2141.39	3.04	1.29	0.89	1.87	0.18	0.1885
	10	257125	19006	854589.68	2.22	0.98	0.96	1	0.06	0.0108
	Internal Reference Group	3680	458	12328.79	3.71	1.31	1.14	1.51	<0.001	0.0719
28-day CVD (Binary)	Control	932217	518	3234792.88	0.02	1.00 (Reference)	NA	NA	NA	NA
	1	4719	6	16496.06	0.04	4.84	0.53	44.27	0.16	1.1296
	2	21726	19	70001.80	0.03	2	0.86	4.69	0.11	0.4342
	3	26105	14	86496.76	0.02	0.88	0.38	2.07	0.77	0.4341
	4	236523	182	747615.17	0.02	1.45	1.13	1.84	<0.001	0.1238
	5	15901	28	47675.87	0.06	4.16	1.8	9.64	<0.001	0.4285
	6	267765	243	923032.86	0.03	1.81	1.44	2.27	<0.001	0.1158
	7	9496	5	32501.34	0.02	0.83	0.24	2.9	0.77	0.6376
	8	88481	56	305623.24	0.02	1.57	0.99	2.49	0.05	0.2347
	9	696	<5	-	-	-	-	-	-	-
	10	257125	218	854589.68	0.03	1.51	1.19	1.92	<0.001	0.1226
	Internal Reference Group	3680	<5	-	-	-	-	-	-	-
28-day CVD (Total count)	Control	932217	525	3234792.88	0.02	1.00 (Reference)	NA	NA	NA	NA
	1	4719	6	16496.06	0.04	4.84	0.53	44.37	0.16	1.13
	2	21726	19	70001.80	0.03	2	0.85	4.69	0.11	0.4345
	3	26105	14	86496.76	0.02	0.88	0.38	2.07	0.78	0.4351
	4	236523	184	747615.17	0.02	1.41	1.11	1.8	<0.001	0.1228
	5	15901	28	47675.87	0.06	4.14	1.79	9.59	<0.001	0.428

	6	267765	244	923032.86	0.03	1.79	1.43	2.25	<0.001	0.1154
	7	9496	5	32501.34	0.02	0.84	0.24	2.92	0.78	0.6376
	8	88481	56	305623.24	0.02	1.57	0.99	2.49	0.05	0.2349
	9	696	<5	-	-	-	-	-	-	-
	10	257125	221	854589.68	0.03	1.51	1.19	1.92	<0.001	0.1222
	Internal Reference Group	3680	<5	-	-	-	-	-	-	-
28-day Blood clot (Binary)	Control	932217	598	3234792.88	0.02	1.00 (Reference)	NA	NA	NA	NA
	1	4719	11	16496.06	0.07	139344.98	0	6.68E+91	0.91	101.8318
	2	21726	32	70001.80	0.05	3.18	1.5	6.71	<0.001	0.3817
	3	26105	28	86496.76	0.03	1.86	0.97	3.59	0.06	0.3345
	4	236523	207	747615.17	0.03	1.78	1.39	2.27	<0.001	0.1252
	5	15901	20	47675.87	0.04	1.47	0.7	3.09	0.31	0.3803
	6	267765	267	923032.86	0.03	1.48	1.2	1.81	<0.001	0.1047
	7	9496	10	32501.34	0.03	1.91	0.63	5.76	0.25	0.5631
	8	88481	52	305623.24	0.02	0.77	0.51	1.16	0.21	0.2095
	9	696	<5	-	-	-	-	-	-	-
	10	257125	210	854589.68	0.02	1.07	0.85	1.35	0.56	0.1175
	Internal Reference Group	3680	<5	-	-	-	-	-	-	-
28-day Blood clot (Total Count)	Control	932217	603	3234792.88	0.02	1.00 (Reference)	NA	NA	NA	NA
	1	4719	11	16496.06	0.07	135037.14	0	5.30E+91	0.91	101.7291
	2	21726	32	70001.80	0.05	3.18	1.51	6.72	<0.001	0.3817

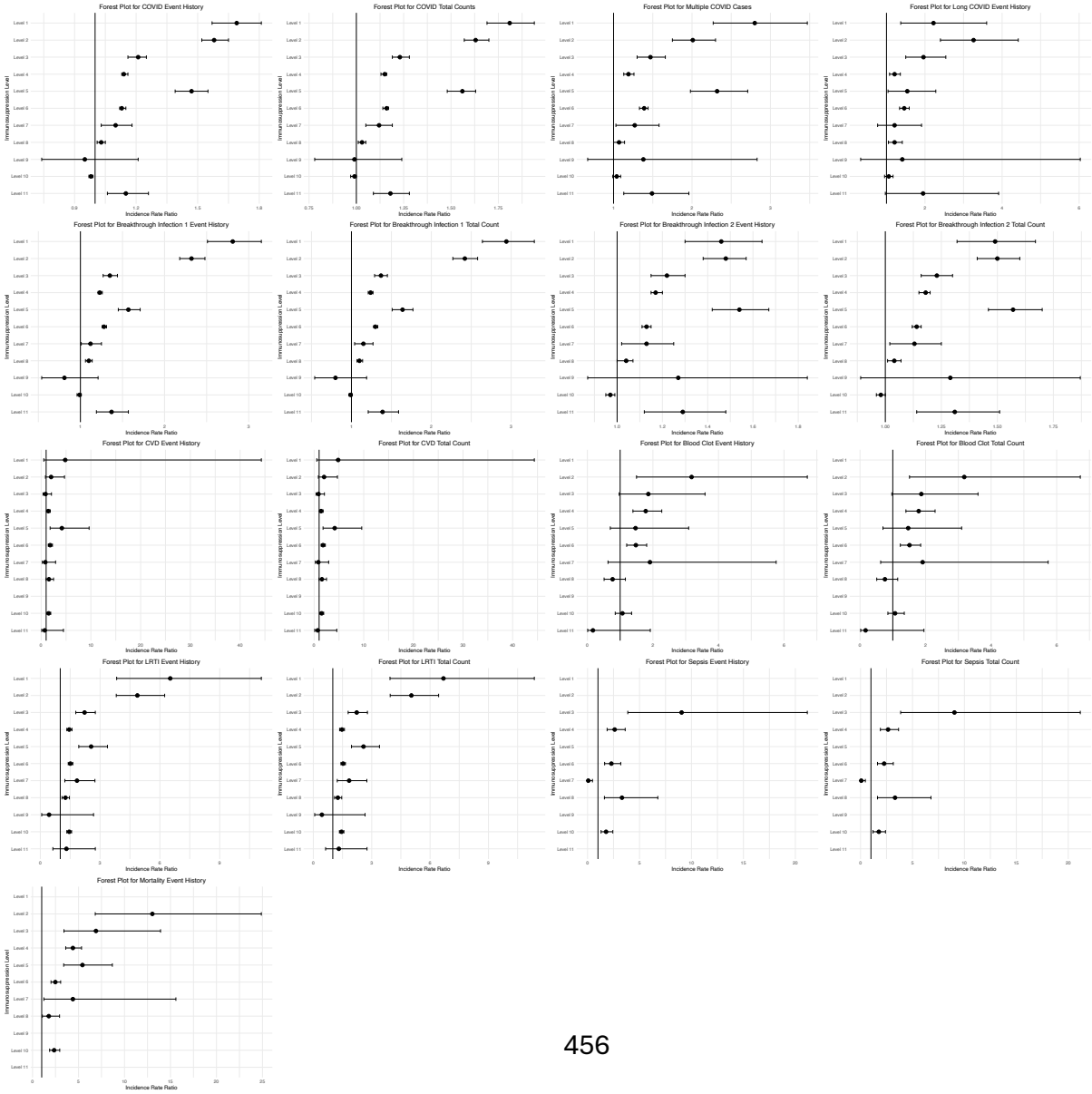
	3	26105	28	86496.76	0.03	1.87	0.97	3.6	0.06	0.3343
	4	236523	208	747615.17	0.03	1.79	1.4	2.29	<0.001	0.1251
	5	15901	20	47675.87	0.04	1.47	0.7	3.1	0.31	0.3808
	6	267765	274	923032.86	0.03	1.51	1.23	1.85	<0.001	0.104
	7	9496	10	32501.34	0.03	1.91	0.63	5.74	0.25	0.5624
	8	88481	53	305623.24	0.02	0.76	0.51	1.15	0.2	0.2075
	9	696	<5	-	-	-	-	-	-	-
	10	257125	214	854589.68	0.03	1.07	0.85	1.35	0.56	0.117
	Internal Reference Group	3680	<5	-	-	-	-	-	-	-
28-day LRTI (Binary)	Control	932217	4381	3234792.88	0.14	1.00 (Reference)	NA	NA	NA	NA
	1	4719	112	16496.06	0.68	6.52	3.83	11.09	<0.001	0.2709
	2	21726	365	70001.80	0.52	4.87	3.81	6.24	<0.001	0.1261
	3	26105	299	86496.76	0.35	2.22	1.78	2.76	<0.001	0.1122
	4	236523	1462	747615.17	0.20	1.45	1.33	1.59	<0.001	0.0445
	5	15901	205	47675.87	0.43	2.55	1.93	3.37	<0.001	0.1413
	6	267765	2103	923032.86	0.23	1.51	1.4	1.63	<0.001	0.0385
	7	9496	82	32501.34	0.25	1.84	1.23	2.74	<0.001	0.2045
	8	88481	511	305623.24	0.17	1.26	1.09	1.46	<0.001	0.0741
	9	696	<5	-	-	-	-	-	-	-
	10	257125	1880	854589.68	0.22	1.45	1.33	1.57	<0.001	0.0418
	Internal Reference Group	3680	18	12328.79	0.15	1.31	0.63	2.76	0.47	0.3776

28-day LRTI (Total Count)	Control	932217	4417	3234792.88	0.14	1.00 (Reference)	NA	NA	NA	NA
	1	4719	116	16496.06	0.70	6.69	3.94	11.36	<0.001	0.2701
	2	21726	380	70001.80	0.54	5.04	3.95	6.44	<0.001	0.125
	3	26105	303	86496.76	0.35	2.23	1.79	2.78	<0.001	0.1118
	4	236523	1487	747615.17	0.20	1.47	1.35	1.6	<0.001	0.0443
	5	15901	208	47675.87	0.44	2.58	1.96	3.4	<0.001	0.141
	6	267765	2141	923032.86	0.23	1.53	1.42	1.65	<0.001	0.0383
	7	9496	82	32501.34	0.25	1.84	1.23	2.75	<0.001	0.2046
	8	88481	515	305623.24	0.17	1.26	1.09	1.46	<0.001	0.0739
	9	696	<5	-	-	-	-	-	-	-
	10	257125	1898	854589.68	0.22	1.45	1.34	1.57	<0.001	0.0416
	Internal Reference Group	3680	18	12328.79	0.15	1.31	0.63	2.76	0.47	0.3778
28-day Sepsis (Binary)	Control	932217	269	3234792.88	0.01	1.00 (Reference)	NA	NA	NA	NA
	1	4719	13	16496.06	0.08	23.41	2.75	199.6	0	1.0934
	2	21726	53	70001.80	0.08	36.74	12.45	108.36	<0.001	0.5519
	3	26105	40	86496.76	0.05	9.05	3.87	21.15	<0.001	0.4332
	4	236523	159	747615.17	0.02	2.61	1.88	3.62	<0.001	0.1665
	5	15901	28	47675.87	0.06	17.02	4.62	62.67	<0.001	0.665
	6	267765	150	923032.86	0.02	2.29	1.64	3.19	<0.001	0.1691
	7	9496	<5	-	-	-	-	-	-	-
	8	88481	34	305623.24	0.01	3.31	1.62	6.76	0	0.364
	9	696	<5	-	-	-	-	-	-	-
	10	257125	151	854589.68	0.02	1.78	1.3	2.43	0	0.1597

	Internal Reference Group	3680	<5	-	-	-	-	-	-	-
28-day Sepsis (Total Count)	Control	932217	271	3234792.88	0.01	1.00 (Reference)	NA	NA	NA	NA
	1	4719	13	16496.06	0.08	23.83	2.79	203.51	0	1.0943
	2	21726	53	70001.80	0.08	37.1	12.58	109.45	<0.001	0.5519
	3	26105	40	86496.76	0.05	9.04	3.86	21.16	<0.001	0.4338
	4	236523	161	747615.17	0.02	2.65	1.91	3.66	<0.001	0.1662
	5	15901	29	47675.87	0.06	17.42	4.76	63.82	<0.001	0.6624
	6	267765	151	923032.86	0.02	2.27	1.63	3.15	<0.001	0.1681
	7	9496	<5	-	-	-	-	-	-	-
	8	88481	34	305623.24	0.01	3.32	1.63	6.78	<0.001	0.3643
	9	696	<5	-	-	-	-	-	-	-
	10	257125	151	854589.68	0.02	1.76	1.2	2.4	<0.001	0.1593
	Internal Reference Group	3680	<5	-	-	-	-	-	-	-
Long COVID	Control	932217	3147	3234792.88	0.10	1.00 (Reference)	NA	NA	NA	NA
	1	4719	59	16496.06	0.36	2.22	1.37	3.6	<0.001	0.2467
	2	21726	176	70001.80	0.25	3.26	2.4	4.42	<0.001	0.1552
	3	26105	178	86496.76	0.21	1.96	1.5	2.54	<0.001	0.1325
	4	236523	716	747615.17	0.10	1.21	1.08	1.36	<0.001	0.0586
	5	15901	66	47675.87	0.14	1.54	1.04	2.28	0.03	0.2014
	6	267765	1458	923032.86	0.16	1.46	1.34	1.59	<0.001	0.0438
	7	9496	45	32501.34	0.14	1.21	0.77	1.91	0.41	0.2323

	8	88481	453	305623.24	0.15	1.21	1.05	1.41	0.01	0.0747
	9	696	<5	-	-	-	-	-	-	-
	10	257125	913	854589.68	0.11	1.06	0.95	1.17	0.3	0.0526
	Internal Reference Group	3680	25	12328.79	0.20	1.95	0.97	3.91	0.06	0.3544
Mortality	Control	932217	636	3234792.88	0.02	1.00 (Reference)	NA	NA	NA	NA
	1	4719	13	16496.06	0.08	40.12	4.26	377.86	<0.001	1.1442
	2	21726	84	70001.80	0.12	13.03	6.82	24.88	<0.001	0.3301
	3	26105	45	86496.76	0.05	6.9	3.42	13.92	<0.001	0.358
	4	236523	489	747615.17	0.07	4.39	3.61	5.33	<0.001	0.0994
	5	15901	90	47675.87	0.19	5.43	3.39	8.68	<0.001	0.2395
	6	267765	330	923032.86	0.04	2.48	2.01	3.06	<0.001	0.1081
	7	9496	14	32501.34	0.04	4.39	1.24	15.59	0.02	0.646
	8	88481	51	305623.24	0.02	1.77	1.07	2.94	0.03	0.2583
	9	696	<5	-	-	-	-	-	-	-
	10	257125	273	854589.68	0.03	2.35	1.86	2.96	<0.001	0.1189
	Internal Reference Group	3680	<5	-	-	-	-	-	-	-

Summary Forest Plot of Subgroup Analysis of Age-Sex Matched & Fully Adjusted Cohort by Vaccine Uptake, >5 doses



Summary Table for Incidence Rates per 100 Person-years by Vaccine Uptake

Outcome of Interest	Phenotype Level	Incidence Rate per 100 person years, Unvaccinated	Incidence Rate per 100 person years, <5 doses	Incidence Rate per 100 person years, >5 doses
COVID-19 infection (Binary)	Control	3.19	7.25	5.70
	1	7.46	11.13	12.67
	2	6.71	9.05	8.71
	3	4.89	7.94	7.57
	4	5.55	7.02	5.63
	5	9.40	9.38	7.80
	6	5.70	8.04	6.61
	7	6.05	7.94	6.35
	8	5.68	8.63	6.82
	9	5.44	8.64	6.12
	10	5.01	6.43	5.54
	Internal Reference Group	2.84	7.09	9.34
COVID-19 infection (Total Count)	Control	3.46	7.89	6.20
	1	8.50	13.12	15.09
	2	7.24	10.27	9.81
	3	5.39	8.86	8.50
	4	5.97	7.65	6.09
	5	10.37	10.95	9.11
	6	6.23	8.86	7.35
	7	6.74	8.85	7.07
	8	6.33	9.54	7.55
	9	6.15	9.76	7.00
	10	5.40	7.05	6.05
	Internal Reference Group	3.27	7.97	10.54
Multiple COVID-19 cases	Control	0.26	0.59	0.46
	1	0.92	1.64	2.12
	2	0.46	1.04	0.95
	3	0.46	0.83	0.82
	4	0.37	0.57	0.43
	5	0.90	1.32	1.17
	6	0.50	0.75	0.67
	7	0.66	0.80	0.64
	8	0.61	0.83	0.66
	9	0.47	0.94	0.84
	10	0.37	0.57	0.46
	11	0.37	0.79	1.11
Breakthrough infection within 3 months of vaccination(Binary)	0	NA	2.47	2.05
	1	NA	3.55	7.34

	2	NA	2.76	4.46
	3	NA	2.50	3.10
	4	NA	2.15	2.12
	5	NA	2.44	3.21
	6	NA	2.65	2.68
	7	NA	2.51	2.46
	8	NA	2.97	2.62
	9	NA	3.01	2.05
	10	NA	1.84	1.96
	Internal Reference Group	NA	2.22	4.14
Breakthrough infection within 3 months of vaccination (Total Count)	Control	NA	2.52	2.10
	1	NA	3.61	7.94
	2	NA	2.81	4.76
	3	NA	2.55	3.24
	4	NA	2.18	2.18
	5	NA	2.49	3.44
	6	NA	2.71	2.78
	7	NA	2.55	2.58
	8	NA	3.03	2.70
	9	NA	3.07	2.10
	10	NA	1.87	2.01
	Internal Reference Group	NA	2.27	4.34
Breakthrough infection between 4 and 6 months of vaccination (Binary)	Control	NA	2.25	2.36
	1	NA	3.21	4.57
	2	NA	2.52	3.45
	3	NA	2.26	2.99
	4	NA	2.08	2.46
	5	NA	2.40	3.35
	6	NA	2.39	2.72
	7	NA	2.22	2.62
	8	NA	2.63	2.75
	9	NA	2.49	2.90
	10	NA	1.62	2.16
	Internal Reference Group	NA	1.79	3.59
Breakthrough infection between 4 and 6 months of vaccination (Total Count)	Control	NA	2.27	2.42
	1	NA	3.34	4.79
	2	NA	2.58	3.59
	3	NA	2.30	3.11
	4	NA	2.12	2.53

	5	NA	2.47	3.51
	6	NA	2.42	2.81
	7	NA	2.25	2.69
	8	NA	2.66	2.83
	9	NA	2.52	3.04
	10	NA	1.64	2.22
	Internal Reference Group	NA	1.84	3.71
28-day CVD (Binary)	Control	NA	0.01	0.02
	1	NA	0.09	0.04
	2	NA	0.03	0.03
	3	NA	0.01	0.02
	4	NA	0.02	0.02
	5	NA	0.08	0.06
	6	NA	0.01	0.03
	7	NA	0.02	0.02
	8	NA	0.01	0.02
	9	NA	0.00	0.05
	10	NA	0.03	0.03
	Internal Reference Group	NA	0.00	0.02
28-day CVD (Total count)	Control	0.01	0.01	0.02
	1	0.01	0.09	0.04
	2	0.01	0.03	0.03
	3	0.01	0.01	0.02
	4	0.01	0.02	0.02
	5	0.05	0.08	0.06
	6	0.01	0.01	0.03
	7	0.01	0.03	0.02
	8	0.01	0.01	0.02
	9	0.00	0.00	0.05
	10	0.01	0.03	0.03
	Internal Reference Group	0.01	0.00	0.02
28-day Blood clot (Binary)	Control	0.01	0.01	0.02
	1	0.01	0.05	0.07
	2	0.01	0.05	0.05
	3	0.01	0.03	0.03
	4	0.01	0.04	0.03
	5	0.05	0.06	0.04
	6	0.01	0.02	0.03
	7	0.02	0.03	0.03
	8	0.01	0.01	0.02
	9	0.00	0.00	0.05
	10	0.01	0.02	0.02

28-day Blood clot (Total Count)	Internal Reference Group	0.01	0.01	0.01
	Control	0.01	0.01	0.02
	1	0.01	0.05	0.07
	2	0.01	0.05	0.05
	3	0.02	0.03	0.03
	4	0.02	0.04	0.03
	5	0.03	0.06	0.04
	6	0.02	0.02	0.03
	7	0.02	0.03	0.03
	8	0.01	0.01	0.02
	9	0.00	0.00	0.05
	10	0.02	0.02	0.03
28-day LRTI (Binary)	Internal Reference Group	0.01	0.01	0.01
	Control	0.01	0.11	0.14
	1	0.01	0.57	0.68
	2	0.01	0.50	0.52
	3	0.02	0.20	0.35
	4	0.02	0.23	0.20
	5	0.03	0.51	0.43
	6	0.02	0.21	0.23
	7	0.02	0.22	0.25
	8	0.01	0.13	0.17
	9	0.00	0.12	0.09
	10	0.02	0.22	0.22
28-day LRTI (Total Count)	Internal Reference Group	0.01	0.14	0.15
	Control	0.08	0.11	0.14
	1	0.22	0.57	0.70
	2	0.16	0.52	0.54
	3	0.15	0.21	0.35
	4	0.13	0.24	0.20
	5	0.27	0.51	0.44
	6	0.14	0.21	0.23
	7	0.14	0.23	0.25
	8	0.10	0.13	0.17
	9	0.00	0.12	0.09
	10	0.18	0.23	0.22
28-day Sepsis (Binary)	Internal Reference Group	0.08	0.14	0.15
	Control	0.08	0.01	0.01
	1	0.22	0.17	0.08
	2	0.16	0.16	0.08
	3	0.15	0.03	0.05
	4	0.13	0.03	0.02

	5	0.28	0.09	0.06
	6	0.14	0.01	0.02
	7	0.15	0.03	0.01
	8	0.10	0.01	0.01
	9	0.00	0.00	0.00
	10	0.19	0.02	0.02
	Internal Reference Group	0.08	0.01	0.02
28-day Sepsis (Total Count)	Control	0.00	0.01	0.01
	1	0.07	0.18	0.08
	2	0.03	0.17	0.08
	3	0.02	0.03	0.05
	4	0.01	0.03	0.02
	5	0.04	0.09	0.06
	6	0.01	0.01	0.02
	7	0.00	0.03	0.01
	8	0.00	0.01	0.01
	9	0.00	0.00	0.00
	10	0.01	0.02	0.02
	Internal Reference Group	0.00	0.01	0.02
Long COVID	Control	0.00	0.10	0.10
	1	0.07	0.25	0.36
	2	0.04	0.18	0.25
	3	0.02	0.18	0.21
	4	0.01	0.10	0.10
	5	0.04	0.11	0.14
	6	0.01	0.16	0.16
	7	0.00	0.21	0.14
	8	0.00	0.13	0.15
	9	0.00	0.18	0.19
	10	0.01	0.11	0.11
	Internal Reference Group	0.00	0.10	0.20
Mortality	Control	0.09	0.07	0.02
	1	0.32	0.45	0.08
	2	0.29	0.65	0.12
	3	0.15	0.10	0.05
	4	0.22	0.32	0.07
	5	0.65	0.64	0.19
	6	0.12	0.10	0.04
	7	0.19	0.13	0.04
	8	0.06	0.03	0.02
	9	0.16	0.03	0.00
	10	0.18	0.13	0.03
	Internal Reference Group	0.03	0.03	0.01

Appendix 27: DESTINIES Patient Panel Webinar

Copy of DESTINIES Patient Panel Consent Form

Meredith Leston
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+447896980320

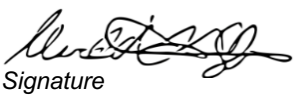
CONSENT FORM

The DESTINIES Patient Panel Webinar: 'Improving how we monitor COVID-19 spread and outcomes in the immunosuppressed'

Name of Researcher: Meredith Leston

If you agree, please put your initials in the box provided

6. I understand that my participation in this webinar and subsequent vote is voluntary and that I am free to withdraw at any time without giving any reason.	
7. I agree to the webinar being audio recorded.	
8. I understand that findings from this work will be written up for publication in an academic journal.	
9. I agree to take part in this webinar and subsequent vote.	

_____	_____	_____
Name of Panellist	*Date*	*Signature*
Meredith Leston	18.04.25	
Name of Person taking Consent	*Date*	*Signature*

Distribution copy of DESTINIES Patient Panel Webinar presentation

UNIVERSITY OF OXFORD

NUFFIELD DEPARTMENT OF PRIMARY CARE HEALTH SCIENCES (ORCHID)

Royal College of General Practitioners Research & Surveillance Centre (RCGP)

EMIS connecting healthcare

UK Health Security Agency

Who am I?

- **Doctoral student at the University of Oxford**, using UK disease surveillance data (Oxford-RCGP RSC) to better understand how COVID-19 affects immunosuppressed patients.
- **Public Health consultant**, giving me lived experience of how unhelpful our current way of handling immunosuppressed data is for creating the care plans and preventative measures that can protect these patients.
- **Long COVID patient**, creating a deeply personal connection with this work. I know what it's like to have my condition be ignored in mainstream disease surveillance and excluded from largescale clinical trials and how frightening that can be.

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What is the problem we are trying to solve?

- Disease surveillance allows us to keep a close eye on how diseases are emerging, spreading and impacting the population.
- Disease surveillance requires collecting patient-level data from diverse sources including hospitals, clinics, laboratories, wastewater and even social media posts.
- By looking at changes in this data over time, we can quickly respond to any worrying new trends by creating specialised policies, care plans or pharmaceutical treatments.
- Overall, disease surveillance is essential for keeping a population safe and well. **However, right now we believe it is not doing enough to support the health needs of more complex patients like the immunosuppressed.**

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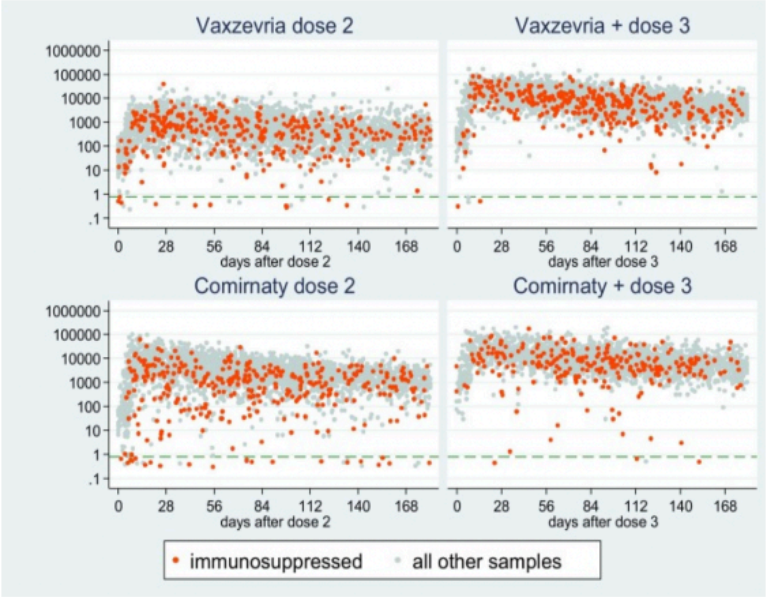
Immunosuppressed disease surveillance today

- Immunosuppressed patients are often excluded from **clinical development trials**. Usually, disease surveillance would counteract these R&D blind spots, but **current dataflows don't spotlight immunosuppressed health outcomes well enough.**
- Immunosuppressed patients are currently **under-represented in disease surveillance**:
  - IS outcomes hidden in wider risk-group data
  - IS outcomes handled as a single entity
  - IS outcomes only segmented for larger subgroups
- Without specialised data, 'One Size Fits All' protections, products and care pathways can result – underserving some patients and over-restricting the lives of others.

Figure 1: Multi-dose COVID-19 vaccine response



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Why have I brought us all together?

- I need your help to decide whether my work to improve COVID-19 disease surveillance for the immunosuppressed **really is a step forward from current practice.**
- Over the last 4 years, I've brought together all studies of COVID-19 outcomes in the immunosuppressed (~19,000!) and the opinions of global experts in immunology, infectious disease and vaccination **to clarify exactly which patients should still be considered immunosuppressed and their individual risks for severe COVID-19.**
- This information has created a new filter for RCGP RSC disease surveillance of COVID-19 in the immunosuppressed – **the DESTINIES Digital Phenotype.**
- I'm going to present findings from our test runs of DESTINIES Phenotype in real world data, and **you can vote on whether you'd be happy seeing this adopted as standard in UK disease surveillance.**
- **Patients get the last word -** we want to make sure our surveillance systems are supportive to your health and wellbeing, so your comments, suggested edits or criticisms are incredibly important.

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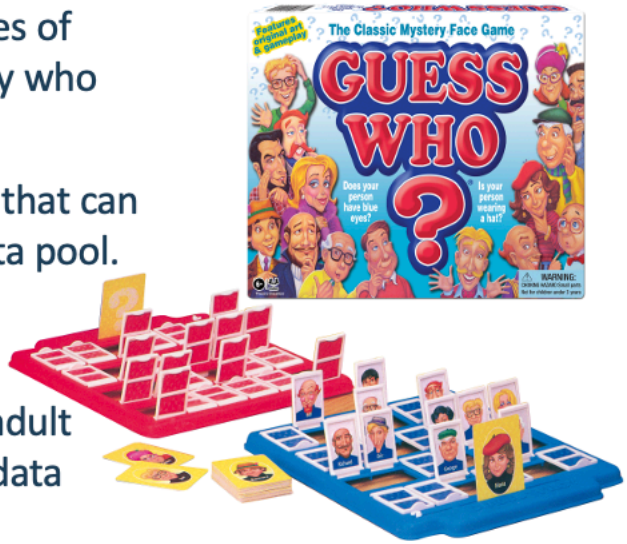
But what is a digital phenotype?

- Health data is famously messy. Trying to select for a specific population is a bit like playing a game of *Guess Who?* – you need to make a series of well-defined requests using clear identifiers to narrow in on exactly who you're looking for. **This is exactly what a digital phenotype does.**
- A phenotype is made up of computer-readable requests and rules that can both define and filter out a population of interest from a wider data pool. Depending on a phenotype's structure, it can also subdivide the population it extracts by phenotype levels.
- As we shall see, The DESTINIES Phenotype can be used to extract adult immunosuppressed records from both national and international data sources and segment health outcomes by their COVID risk group.
- **Do you have any questions** before I show you how we built the DESTINIES Phenotype?



DESTINIES Phenotype Foundations: Literature Review and Meta Analysis

Figure 2: Literature screening

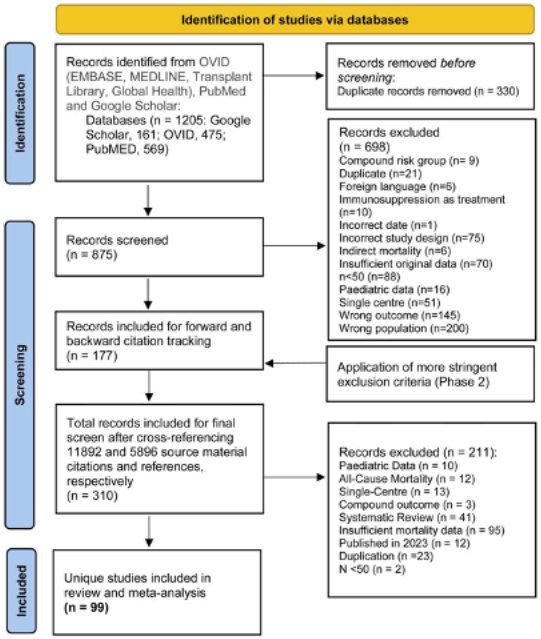
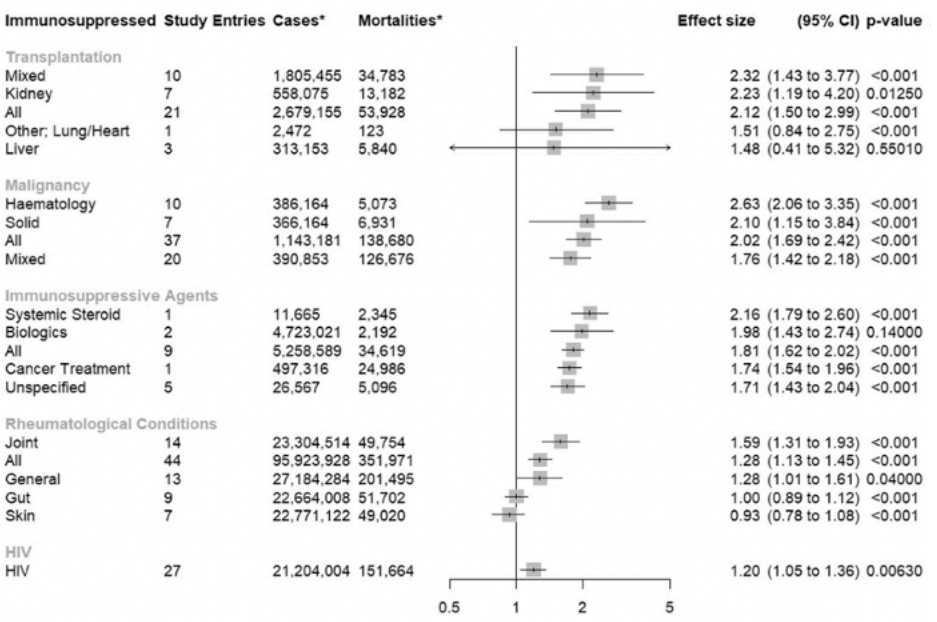


Figure 3: COVID-19 mortality compared to the immunocompetent

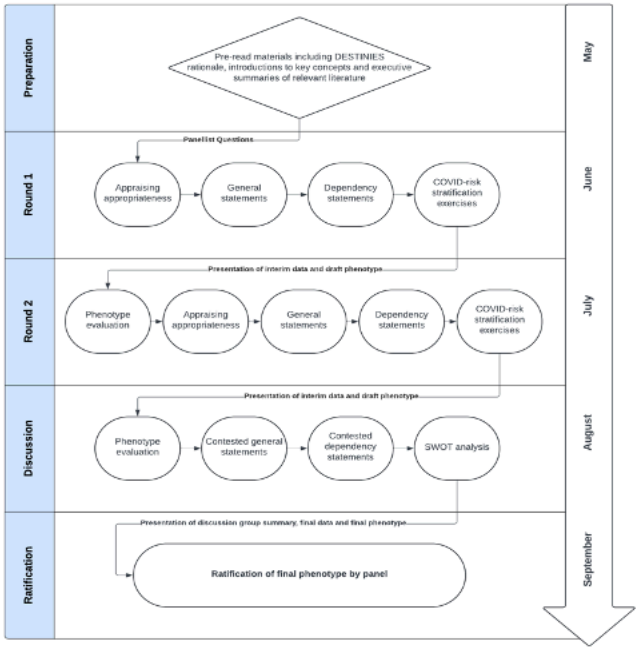


DESTINIES Phenotype Foundations: International Consensus Building

We successfully recruited **64 experts (4 continents; 16 countries)** in immunology/vaccinology/infectious diseases from the following organisations:

- World Health Organisation (WHO) Global Advisory Committee on Vaccine Safety (GACVS)
- Coalition for Epidemic Preparedness Innovations (CEPI) Scientific Advisory Committee (SAC)
- The Global Immunocompromised Health Coalition (GHIC)
- The European Alliance of Associations for Rheumatology (EULAR)
- European Medicines Agency's (EMA) Vaccines Working Party (VWP)
- Joint Committee on Vaccination and Immunisation (JCVI)
- COVID-19 Neutralising Monoclonal Antibodies (nMABs) and Antivirals Access Independent Advisory Group
- UK Scientific Advisory Group for Emergencies (SAGE)
- Independent Scientific Advisory Group for Emergencies (Indie_SAGE)
- Centers for Disease Control and Prevention (CDC) Advisory Committee on Immunization Practices (ACIP)
- Food and Drug Administration (FDA) Vaccine Advisory Panel
- The Nuffield Department of Primary Care Health Sciences, University of Oxford
- The Nuffield Department of Medicine, University of Oxford

Figure 4: DESTINIES Consensus Study Timeline



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RCGP Royal College of General Practitioners Research & Surveillance Centre

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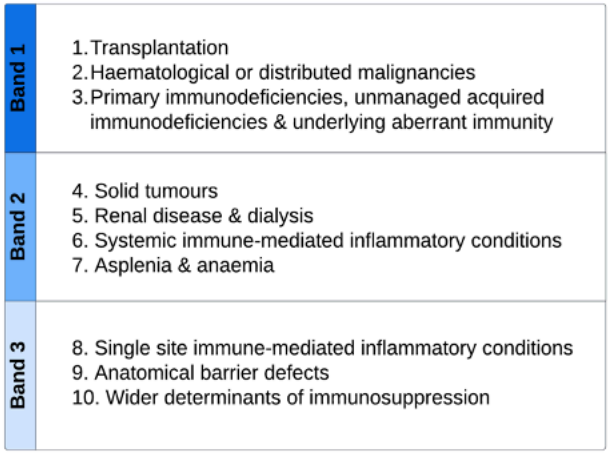
94% Approval

The DESTINIES Phenotype

Figure 5: Schematic & full operationalisation of the DESTINIES Phenotype for COVID-19 surveillance



Internal reference group: Drug-managed HIV
Control: General Population not identified as immunosuppressed

Transplantations:
Hematopoietic stem cell transplantation (Bone Marrow/ Stem Cell transplantation)
Multi-Organ Transplantation
Solid Organ Transplantation
Islet Transplantation

Haematological or distributed malignancies
Haematological Malignancies
Generalised Malignancies (metastasis)
Medical records with remission codes excluded

Primary immunodeficiencies, unmanaged acquired immunodeficiencies & underlying aberrant immunity
Genetic disorders of the immune system (Primary Immunodeficiencies: e.g. SCID)
AIDS-defining Illness (HIV-related conditions including tuberculosis, Kapsi's sarcoma, candidiasis, histoplasmosis, isosporiasis, recurrent pneumonia etc.) & Unmanaged HIV
Underlying aberrant immunity (e.g. graft-vs-host disease, graft rejection, absent or incomplete immune reconstitution, neutropenia ANC, lymphopenia ALC, secondary hypogammaglobinaemia etc.)
Down syndrome

Solid tumours
Medical records with remission codes excluded

Renal Disease & Dialysis
Dialysis
Renal Autoimmune Conditions (e.g. Lupus nephritis, Glomerulonephritis, IgA nephropathy etc.)
Chronic Kidney Disease (Late Stage, 4+)
Nephrotic Syndrome
Excluding Chronic Kidney Disease < Stage 4

Systemic immune-mediated inflammatory conditions
Rheumatological autoimmune diseases (e.g. systemic lupus erythematosus, rheumatoid arthritis, Siögren's syndrome, idiopathic inflammatory myopathies, ankylosing spondylitis, vasculitides, gout etc.)
Haematological autoimmune diseases (e.g. Evan's syndrome, immune thrombocytopenic purpura, antiphospholipid syndrome, autoimmune neutropenia, VEXAS etc.)
Gastrointestinal autoimmune conditions (e.g. celiac disease, Crohn's disease, ulcerative colitis, autoimmune gastritis, microscopic colitis, autoimmune pancreatitis, autoimmune hepatitis etc.)
Neurological autoimmune conditions (e.g. multiple sclerosis, myasthenia gravis, neuromyelitis optica etc.)

Anaemia & asplenia
Severe anaemia (e.g. aplastic anaemia, pernicious anaemia, autoimmune haemolytic anaemia etc.)
Sickle cell disease
Asplenia (functional or anatomic)
Generic/ mild cases of anaemia excluded

Single site immune-mediated inflammatory conditions
Autoimmune skin conditions (e.g. psoriasis, dermatitis herpetiformis, vitiligo, pemphigus, scleroderma, dermatomyositis etc.)
Endocrine autoimmune conditions (e.g. Type 1 diabetes mellitus, Hashimoto's thyroiditis, Graves' disease, Addison's disease etc.)
Ophthalmological autoimmune conditions (e.g. Uveitis, Graves' ophthalmopathy etc.)

Anatomical Barrier Defects
Severe burn Injuries
Cerebrospinal Fluid Leak
Cochlear Implant
Mild/ moderate burns excluded (< Stage 3)

Wider determinants of immunosuppression
Pregnancy (final trimester)
Type 2 Diabetes
Malnutrition (operationalised as anorexia nervosa & stunting)
Excluding pregnancies earlier than 3rd trimester

Internal reference group: Drug-managed HIV
Control: General Population not identified as immunosuppressed

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RCGP Royal College of General Practitioners Research & Surveillance Centre

EMIS connecting healthcare

UK Health Security Agency

Pilot Study I: Testing IMID Phenotype levels in COVID-19 survey data

Figure 6: Mild COVID-19 vaccine side effects presented by DESTINIES Immune Mediated Inflammatory Disease (IMID) categories

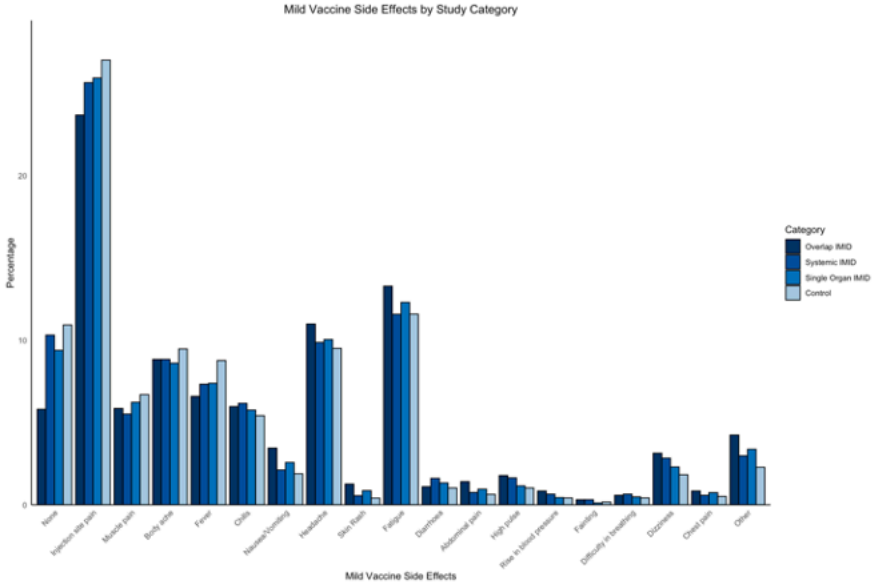
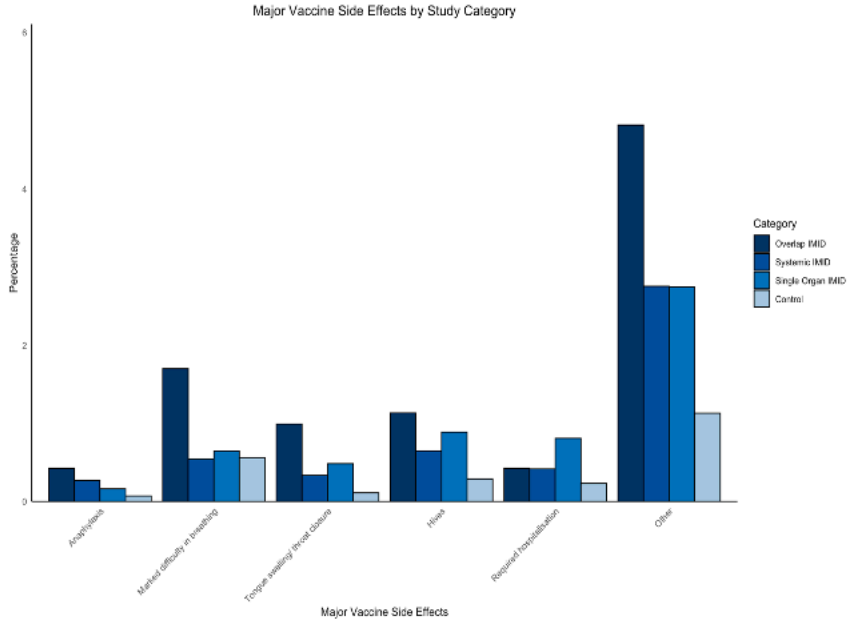
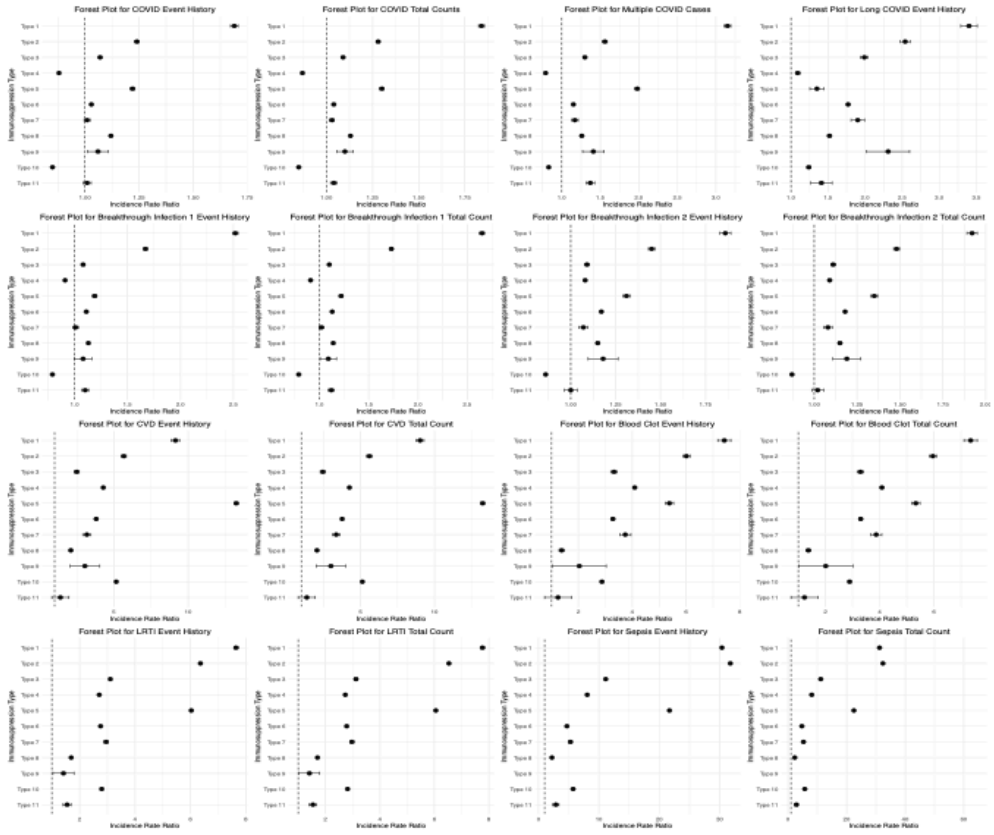


Figure 7: Major COVID-19 vaccine side effects presented by DESTINIES IMID categories



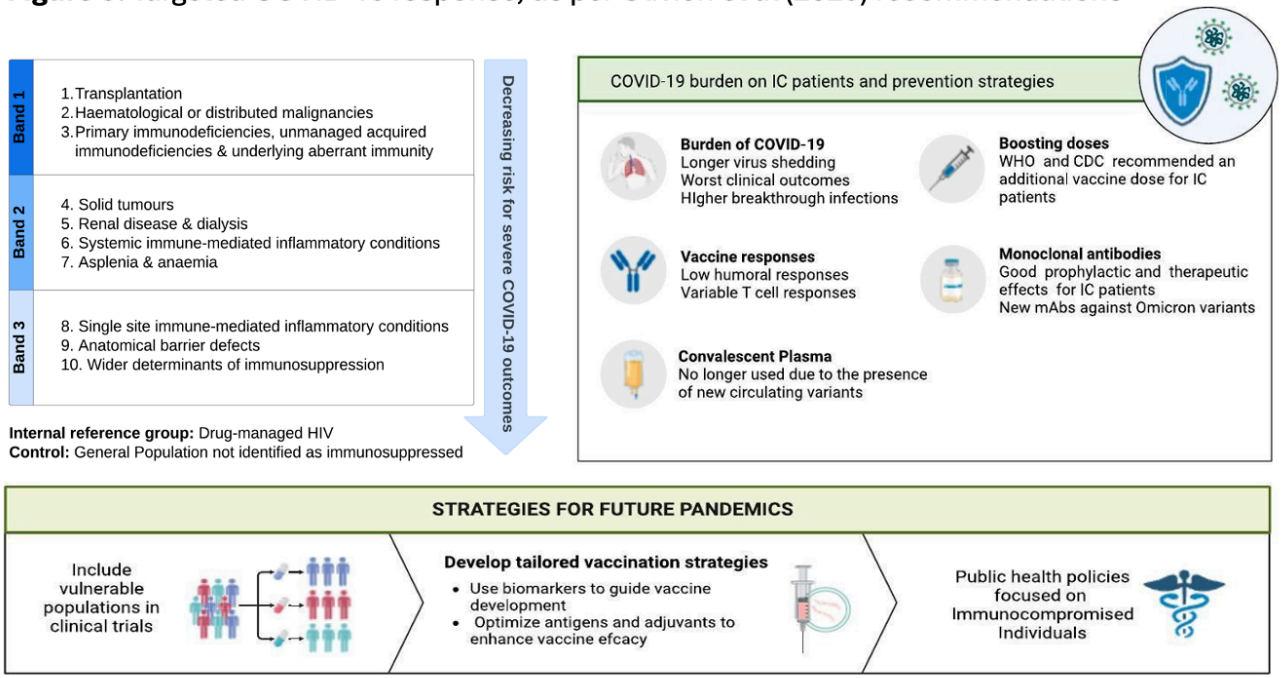
Pilot Study II: Testing the whole DESTINIES Phenotype in historical RCGP RSC data

Figure 8: Incidence rate ratios of severe 28-day COVID-19 outcomes between DESTINIES Phenotype levels



Higher resolution data means more specialised support

Figure 9: Targeted COVID-19 response, as per Olivieri et al (2025) recommendations



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Now meets then

Figure 10, NOW: Severe COVID-19 outcomes by DESTINIES levels

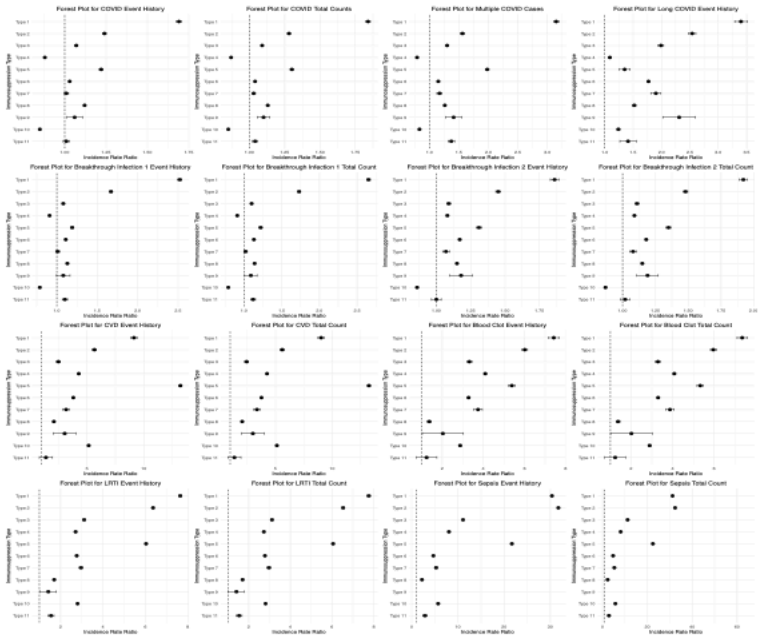
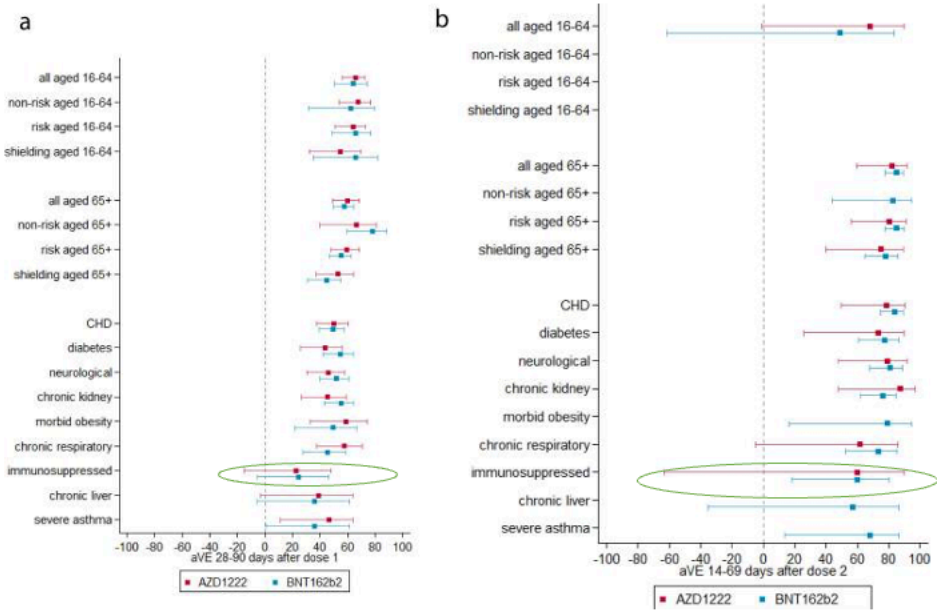


Figure 11, THEN: COVID-19 vaccine effectiveness after dose 1 (a) and dose 2 (b) by risk group



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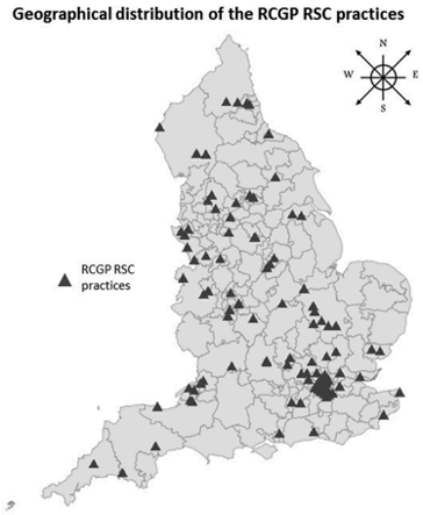
What comes next?



Thank you

DESTINIES Patient Panel Feedback and Voting Form Question Set

Online attendance, n = 25

Overall participation, n = 33

Opportunity for DESTINIES Patient Panel to appraise DESTINIES Phenotype, ratifying its future use in national disease surveillance data flows.

Patient panellists were introduced to digital phenotyping, current approach to immunosuppressed disease surveillance, its limitations, and this work's attempt to address them.

Patients were given the opportunity to ask any questions in real-time as well as via feedback and voting form (question set provided below).

Name
Email
Country of residence
Gender
Class of medical condition
If you feel comfortable doing so, please specify the condition you have been diagnosed with. This information will be used to check we have obtained feedback from all those we hope to support through this work.
Please write down any questions you have about the research we presented, the DESTINIES Phenotype or our future plans.
Please write down any feedback you have on the research we presented and our DESTINIES Phenotype.
To what extent do you agree with the following statements about the DESTINIES phenotype? [I think this phenotype should be used in COVID-19 disease surveillance moving forwards.]
To what extent do you agree with the following statements about the DESTINIES phenotype? [I think this phenotype represents a step forward for immunosuppressed COVID-19 disease surveillance.]
To what extent do you agree with the following statements about the DESTINIES phenotype? [I would like to see this phenotype trialled in the surveillance of other diseases (e.g. seasonal flu, pneumonia etc.)]
I understand that this work is part of an ongoing research project hosted by The University of Oxford.
I understand that outcomes of anonymised voting will be written up for publication in a scientific journal and doctoral thesis.

DESTINIES Patient Panel Feedback During & After Webinar

Comments made and questions asked during webinar, '*Improving how we monitor COVID-19 spread and outcomes in the immunosuppressed':*

- *'There is no wastewater surveillance in UK'*
- *'Immunosuppressed people are being disproportionally higher negatively impacted'*
- *'What is definition of immunosuppressed?'*
- *'Will this be useful in future pandemics or is it Covid-19 specific?'*
- *'What is your estimation of number of IS people in UK? There seems to be a mixture of figures reported…'*
- *'Where do you get your info/ data from; hospitals, GPs?'*
- *'Are you using AI/MML to develop this digital phenotype?'*
- *'Are you linking up with Stravinsky study?'*
- *'Does the broad definition of IS only include people on immunosuppressive medication?'*
- *'With your definition of IS, have you created a scale, i.e. which groups are more IS-ed than others- and does this equate to risk levels?'*
- *'Clin.diagn. will be more or less equivalent internationally even if the definition of IS is not.'*
- *'Can I be included in / informed in future work on DESTINIES?'*

Questions asked via Feedback and Voting Form (unedited):

'If it is adopted what is its future remit, can it continue to be developed and become more precise?'

'How will the data be managed even within disease areas? There's been differing advice around immunisuppression even within disease areas and the impact of this in relation to covid 19.'

'Is the research being published or presented in any conferernce papers, for example?'

'Will the outcomes also be distilled and shared in formats which may be more comprehensible for those who are not familiar with interpreting statistical data or academic texts?'

'It was mentioned that immunosuppressed people such as Solid Organ Transplant Recipients were excluded from the initial vaccine trials, yet this cohort was exactly the group who most needed protection, and for whom the vaccines were least effective. Many of us felt abandoned by this strategy, while seeing resources focussed on the wider population. Will your research encourage future vaccine developers and government health authorities to target resourses towards protecting the most vulnerable.'

‘What happens about multiple conditions - are any conditions additive in their risk eg lupus and hypogamma? Would a model that rabkws on highest risk miss an added risk? Also I’m assuming this model would obviously not be generalisable to other pandemic diseases depending on the profile and risk factors for that disease. Does this profiling include children with these conditions?’

‘I admit that I was disappointed with the webinar. I have been active in the Forgotten Lives group. Covid hit within a month of my transplant, and it took 3 years before my immune system recovered sufficiently to mount a response to the vaccines, so I was shielding for 3 years. Others are still shielding. We knew within a year that those with haematological malignancies were at highest risk for mortality, and that vaccines appeared ineffective for some. I had expected the research to address ways in which the immunocompromised could be recognised and helped more quickly in a future pandemic.’

‘What measures have been taken to ensure this phenotype leaves no one behind?’

‘Hopefully your research will help the NHS /nice etc to get more drugs like Evusheld given to patients who need it quicker than the current system, also paxlovid or drugs similar we need a better system to be given these drugs especially at weekends and bank holidays and many gps don’t understand that patients who are immune compromised/immune suppressed need to get the medication quickly, thank you again for your work’

‘Will your research be fed back to GP surgeries and local health authorities so that they can be better informed and provide a better service. Grateful for hospital treatment but GP surgeries could be so much better.’

‘Will patients be involved in your research going forwards?’

‘Will your work help to educate the media about Covid and its effect on the Immunocompromised. Long Covid is sometimes mentioned but immunocompromised have been forgotten.’

‘Will there be more meetings/work for us, PPI contributors?’

‘1. Is there any scope for your work to be extended beyond the UK?

2. Can the prototype of your work for Covid 19 be extended to other pandemics in future?’

‘How will this assist doctors keep IS patients safe during future outbreaks? Will the data be able to be extrapolated beyond COVID and/or the model used for other outbreaks?’

‘Will you link with the Stravinsky study which is looking at what levels of antibodies are required to have some protection and producing a test that can assess these levels easily similar to lateral flows.’

‘I would be concerned about the NHS using your data as an excuse to ration access to relevant treatment/prevention especially with regard to Covid but potentially future population risk.’

‘More information on inherited Primary Immune Deficiency in relation to your work’

‘Will they be further group talk on this topic’

‘Would your findings be used to collaborate with NHS to provide a clear pathway for obtaining antivirals?’

‘It would have been useful to have a lay summary of the research to date, the next steps and the project endpoints. Also a glossary of terms in the presentation circulated.’

‘A very ambitious and worthy project, will you be able to drill down to very small geographic areas?’

‘Can the results of the study be used in other countries(EU). What are the following steps after the Destinies study?’

‘I see you are working with Forgotten Lives, is this something you intend to carry on doing?’

Feedback provided via Feedback and Voting Form (unedited):

‘The presentation was excellent and gave a clear overview of the project.’

‘Very interesting and insightful. Happy to see more research taking place in this area.’

‘Brilliant, useful’

‘The level of detail in the DESTINIES data was very impressive. I hope that relevant organisations and authorities can use the information to improve the quality of care for immunocompromised people in the future, and also use your data to re-examine what were - in my opinion - inadequate and inconsistent care and protection measures for the immunosuppressed during the Covid-19 pandemic.’

‘I wondered how you were able to assess the risks faced by the immunospuppressed during Covid-19. The data shows that people in the high risk groups faced higher rates of hospitalisations and fatalities, but many of 'us' were also taking more extreme precautions than the general population to avoid becoming infected in the first place. Did the extra precautions result in lower infection rates for immunosuppressed people than might have been expected, and if so, could this have given an artificially lower impression of the actual infection risk?’

‘Anecdotally, I know of many transplant recipients who - like me - were still shielding, mask-wearing etc. 3 years+ into the pandemic, effectively ignoring the official guidelines telling us that we were at no greater risk than anyone eles. Like many others I know who are still exercising social precautions against infection, I have still never knowingly been infected with Covid-19, while others in the wider population report being infected multiple times. So, paradoxically those at least risk were apparently getting infected more easily, while those at high risk may not getting infected to the same extent. I wonder if this was something which is reflected in the data in the DESTINIES research?’

‘Very interesting and thank you for doing this.’

‘Presention was well thought through and put together, addressing things in logical order with flow. Interested to learn more and be involved if opportunities present themselves.’

‘I appreciate that the Destinies Phenotype offers a more granular approach to stratifying those who are immunocompromised. However, practically, a more holistic approach is

needed. The immunocompromised would like vaccines to be offered to their immediate families. There are specific needs for children. There is an urgent need for non-vaccine pre-exposure prophylaxis for those who do not respond to vaccines, and a need for development of such drugs to be fast-tracked in the same way that the vaccines were. Your research was interesting but I struggle to see how it is going to change existing approaches to the immunocompromised (which are inadequate).'

'To be honest, I think the presentation may have been difficult for some patients without a scientific background to follow, but I might be wrong here. Also, I don't really fully agree with the statement that Immunosuppressed patients are often excluded from clinical development trials, I think it would be good to give examples of this and how and what such trials consider as "immunosuppressed" and define in their exclusion criteria. My personal experience is that when I had the covid 19 vaccinations and because I was on rituximab already, the assumption was that I would not produce antibodies. However I produced a good amount to the contrary. I think it is really difficult to apply a phenotype when there is not yet a consensus on the definition of what is immunosuppressed.'

'It would be interesting to consider if mast cell activation syndrome (MCAS) would also fall under the umbrella here or if it would be separate. As someone living with MCAS, I have to take a considerable amount of medication to calm my mast cells - but they are pretty quick to react to both vaccinations and infections (including the one time I've had COVID-19) on top of my rheum & derm conditions.'

'Please keep going with your research for people who are immune compromised and the risks associated with COVID'

'I think it's a great idea. On the one hand I'm very surprised that this type of data isn't available already. Having said that my household feels forgotten. We are still wearing FFP3 masks at medical appointments to protect ourselves. My partner is still working from home 5 years on to protect me. The world needs to know that many of us are still living with the fear of Covid and possible consequences of catching it. Ive just had my 11th Covid jab.'

'Interesting presentation. It would have been to good to have a discussion in breakout rooms.'

'It was an interesting presentation. I am glad to see your focus on monitoring Covid 19 in immunocompromised people. In many countries they still remain a neglected population.'

'I think it's a valuable tool for the future'

'I struggled to read slides 10, 11, 12 even after zooming in but I don't think it was too detrimental to my understanding of the general findings and recommendations.'

'I think it could be increfibly useful, if it is generally accepted.'

'The future plans are so exciting, I look forward to implementation of this project and works'

Some of the slides were blurred. I have emailed about the situation with regard to remission codes and use of this to exclude or include certain patients, therefore, accessing or not treatment pathways.'

'I think your work is critical as immunosuppressed patients need to be able to manage risk'

‘It was an extremely interesting webinar.’

‘As above answer, more detailed information on inherited Primary Immune Deficiency in relation to your work.’

‘Good’

‘Extremely enlightening, the more information immunocompromised patients have, the more they can make choices around Covid.’

‘It would have been useful to have a lay summary of the research to date, the next steps and the project endpoints. Also a glossary of terms in the presentation circulated.’

‘When presenting the phenotypes, it would be useful to explain that just because they are population phenotypes, it doesn’t necessarily follow that people with the worst phenotypes will personally do really badly if they get C19 (could be quite disheartening!)’

‘A simplified poster-presentation in lay language could be circulated to patient groups (2 were mentioned) for informing their members. A simplified tickbox survey could be used to elicit broad brush feedback on utility of the phenotype and should the research continue’

‘Very good and beneficial to the immunosuppressed community.’

‘I think it woulld be good to link in to the Stravinsky Study; if your phenotype can be used at local level it could potantially be very useful to individuals trying to navigate their way through daily life in the current situation where 'Covid is over' makes life difficult’

‘Essential research - much needed’

‘Let participants of anonymized webinar change their avatars. I recognised someone.’

‘The diagrams were to small too see well.’

‘The study is very important. We should stop the Öne size fits them all" thinking. It may probably lead more public acceptance of the nessary measures.’

‘I think it would be very useful to have the Destinies phenotype to try and adapt vaccines and treatment of the immune suppressed we are a forgotten group, people need to understand that our own bodies cause us damage and if there is a system that aids us in any way is of benefit’

‘Presentation was good but unfortunately the screen show was very small and not easy to read or follow.’

Summary of Feedback

- DESTINIES research was well-received by patient panellists – several expressed excitement that disease surveillance might now be better targeted to their interests. Patients agreed that this remit, and patient care more generally, was overly one size fits all – over-constraining the lives of some and underserving extremely high-risk patients.
- Patients were in complete agreement that more had to be done to make the world aware of the ongoing threat of COVID-19 to the immunosuppressed population. They

were also deeply disturbed that such segmented surveillance was not already available as standard.

- Patients were eager to see this work rolled out to remits beyond COVID-19; the benefits of targeted surveillance and highly segmented evidence was clear to them for other disease domains and health use-cases. There were also suggestions to link DESTINIES work to other related study groups, including STRAVINSKY.
- Overall, the presentation was accessible enough for patients to understand the limitations of prevailing approaches to disease surveillance and the prospective value of the DESTINIES phenotype for overcoming them. Certain panellists would have benefitted from a glossary of key terms and enlarged visualisations in the slides that were distributed, however.
- Certain patients expressed concerns that this tool would be misinterpreted as an aid to clinical decision-making; given the immunosuppressed already face obstacles in accessing key medications, booster vaccine doses and enhanced medical attention, they emphasised the importance of communicating its surveillance-specificity to patients. They also worried that the caveats to DESTINIES exclusions (e.g. drug management of HIV and remission in certain cancers) would not be understood by patients; this would be especially detrimental to cancer survivors, many of whom still face heightened vulnerability to COVID-19 after receiving extremely immunosuppressive treatments when their disease was active. Finally, patients noted that Mast Cell Activation Syndrome patients were not mentioned explicitly – a segment of increasing importance due to associations with Long COVID – and questioned whether this phenotype captured heightened risk from multiple conditions and if it artificially suppressed immunosuppressed risk without controlling for increased cases in the non-shielded population.
- The patient panel communicated a keen interest in continuing to contribute to DESTINIES activities. They recommended that a one or two-page explainer be produced and distributed to all associated patient engagement groups to bolster panel membership as well as broader community awareness for the initiative – including amongst caregivers and clinicians.

DESTINIES Patient Panel Final Ratification (n = 33)

	I think this phenotype should be used in COVID-19 disease surveillance moving forwards.	%	I think this phenotype represents a step forward for immunosuppressed COVID-19 disease surveillance.	%	I would like to see this phenotype trialled in the surveillance of other diseases (e.g. seasonal flu, pneumonia etc.)	%
Strongly agree	21	63.64	22	66.67	22	66.67
Somewhat agree	8	24.24	8	24.24	8	24.24
SUM agree	***29***	***87.88***	***30.00***	***90.91***	***30.00***	***90.91***
Unsure	1	3.03	0	0.00	1	3.03
Somewhat disagree	1	3.03	0	0.00	0	0.00
Strongly disagree	2	6.06	3	9.09	2	6.06
SUM disagree	***3***	***9.09***	***3***	***9.09***	***2***	***6.06***