Supplementary material A – Materials and methods

Table 1: Full search strategy

CINAHL (via EBSCOHost) Search filter: the economic facet of this search strategy has been informed by the NHS EED Economics filter and the CADTH Economic search filter.	
1	TI ("group and save*" or "group & save*" or "group-and-save*" or "group and screen*" or "group typing" or "group and hold" or "screen and hold") OR AB ("group and save*" or "group & save*" or "group-and-save*" or "group and screen*" or "group typing" or "group and hold" or "screen and hold")
2	TI ("typ* and screen*" or "type-and-screen" or "type-and-screening" or "typ* and antibody screen*" or "type and hold" or "serum hold") OR AB ("typ* and screen*" or "type-and-screen" or "type-and-screening" or "typ* and antibody screen*" or "type and hold" or "serum hold")
3	TI ("type and cross" or "typing and crossmatching" or "cross-match*" or crossmatch* or "cross match*" or "Cross-Match-to-Transfusion Ratio*" or "crossmatched-to-transfused ratio*" or "transfusion-to-cross-match" or "cross-testing") OR AB ("type and cross" or "typing and crossmatching" or "cross-match*" or crossmatch* or "cross match*" or "Cross-Match-to-Transfusion Ratio*" or "crossmatched-to-transfused ratio*" or "transfusion-to-cross-match" or "cross-testing")
4	TI ("antiglobulin crossmatch*" or "coagulation test*" or "hold clot" or "clot to hold" or "bb hold" or "hold tube" or "electronic remote blood issue" or "electronic cross-match" or "remote blood issue" or "ERBI" or "MSBOS" or "antibody screen*") OR AB ("antiglobulin crossmatch*" or "coagulation test*" or "hold clot" or "clot to hold" or "bb hold" or "hold tube" or "electronic remote blood issue" or "electronic cross-match" or "remote blood issue" or "ERBI" or "MSBOS" or "antibody screen*")
5	TI (blood N2 (typ* or group* or order* or management or administ* or component* or requisition* or overordering or "over-ordering" or wastage or bank or utilisation or utilization or reservation* or product* or schedule)) OR AB (blood N2 (typ* or group* or order* or management or administ* or component* or requisition* or overordering or "over-ordering" or wastage or bank or utilisation or utilization or reservation* or product* or schedule))
6	TI ("blood support" or "ABO typing" or "ABO/Rh typ*" or "blood supply chain" or "bloods" or "PBM program*" or "PBM strateg*") OR AB ("blood support" or "ABO typing" or "ABO/Rh typ*" or "blood supply chain" or "bloods" or "PBM program*" or "PBM strateg*")
7	(MH "Blood Grouping and Crossmatching") OR (MH "Blood Group Incompatibility+") OR (MH "Blood Transfusion+")
8	S1 OR S2 OR S3 OR S4 OR S5 OR S6 OR S7
9	TI (economic* or cost or costs or costly or costing or microcosting or budget* or save* or saving* or expensive or expense* or expenditure* or price* or pricing or financ* or fee or fees) OR AB (economic* or cost or costs or costly or costing or microcosting or budget* or save* or saving* or expensive or expense* or expenditure* or price* or pricing or financ* or fee or fees)
10	TI ("value for money" or "cost-effective*" or "micro-costing") OR AB ("value for money" or "cost-effective*" or "micro-costing")
11	TI ((resource* or service*) N1 (utilisation or utilization)) OR AB ((resource* or service*) N1 (utilisation or utilization))
12	(MH "Economics") OR (MH "Costs and Cost Analysis+") OR (MH "Economic Aspects of Illness") OR (MH "Resource Allocation+") OR (MH "Economic Value of Life") OR (MH "Economics, Pharmaceutical") OR (MH "Fees and Charges+") OR (MH "Budgets") OR (MH "Decision Trees") OR (MH "Health Resource Utilization") OR (MH "Health Resource Allocation") OR (MH "Cost Benefit Analysis") OR (MH "Cost Savings") OR (MH "Cost Control") OR (MH "Health Care Costs") OR (MH "Health Facility Costs")
13	S9 OR S10 OR S11 OR S12
14	S8 and S13
15	PY 2012 OR PY 2013 OR PY 2014 OR PY 2015 OR PY 2016 OR PY 2017 OR PY 2018 OR PY 2019 OR PY 2020 OR PY 2021 OR PY 2022 OR PY 2023
16	S14 AND S15
Cochrane Library (via Wiley)	

Search filter: the economic facet of this search strategy has been informed by the NHS EED Economics filter, the SIGN Economic Studies search filter and the CADTH Economic search filter.	
1	("group and save*" or "group & save*" or "group-and-save*" or "group and screen*" or "group typing" or "group and hold" or "screen and hold"):ti,ab,kw
2	("typ* and screen*" or "type-and-screen" or "type-and-screening" or "typ* and antibody screen*" or "type and hold" or "serum hold"):ti,ab,kw
3	("type and cross" or "typing and crossmatching" or "cross-match*" or crossmatch* or "cross match*" or "Cross-Match-to-Transfusion Ratio*" or "crossmatched-to-transfused ratio*" or "transfusion-to-cross-match" or "cross-testing"):ti,ab,kw
4	("antiglobulin crossmatch*" or "coagulation test*" or "hold clot" or "clot to hold" or "bb hold" or "hold tube" or "electronic remote blood issue" or "electronic cross-match" or "remote blood issue" or "ERBI" or "MSBOS" or "antibody screen*"):ti,ab,kw
5	(blood next/2 (typ* or group* or order* or management or administ* or component* or requisition* or overordering or "over-ordering" or wastage or bank or utilisation or utilization or reservation* or product* or schedule)):ti,ab,kw
6	("blood support" or "ABO typing" or "ABO/Rh typ*" or "blood supply chain" or bloods or "PBM program*" or "PBM strateg*"):ti,ab,kw
7	MeSH descriptor: ["Blood Grouping and Crossmatching"] this term only
8	MeSH descriptor: [Blood Group Incompatibility] explode all trees
9	MeSH descriptor: [Blood Group Antigens] explode all trees
10	MeSH descriptor: [Blood Safety] this term only
11	#1 or #2 or #3 or #4 or #5 or #6 or #7 or #8 or #9 or #10
12	(economic* or cost or costs or costly or costing or microcosting or budget* or save* or saving* or expensive or expense* or expenditure* or price* or pricing or financ* or fee or fees):ti,ab,kw
13	("value for money" or "cost-effective$" or "micro-costing"):ti,ab,kw
14	((resource* or service*) next/1 (utilisation or utilization)):ti,ab,kw
15	MeSH descriptor: [Costs and Cost Analysis] explode all trees
16	MeSH descriptor: [Cost-Benefit Analysis] this term only
17	MeSH descriptor: [Cost Savings] this term only
18	MeSH descriptor: [Cost Control] explode all trees
19	MeSH descriptor: [Cost Allocation] this term only
20	MeSH descriptor: [Cost of Illness] this term only
21	MeSH descriptor: [Cost Sharing] this term only
22	MeSH descriptor: [Health Care Costs] this term only
23	MeSH descriptor: [Hospital Costs] this term only
24	MeSH descriptor: [Health Expenditures] this term only
25	MeSH descriptor: [Medical Audit] this term only
26	MeSH descriptor: [Fees and Charges] explode all trees
27	MeSH descriptor: [Budgets] explode all trees
28	MeSH descriptor: [Direct Service Costs] this term only
29	MeSH descriptor: [Health Resources] this term only
30	MeSH descriptor: [Facilities and Services Utilization] this term only
31	MeSH descriptor: [Employer health costs] this term only
32	MeSH descriptor: [Economics] this term only
33	MeSH descriptor: [Economics, Hospital] explode all trees
34	MeSH descriptor: [Economics, Medical] explode all trees
35	MeSH descriptor: [Economics, Nursing] this term only
36	MeSH descriptor: [Economics, Pharmaceutical] this term only
37	#12 or #13 or #14 or #15 or #16 or #17 or #18 or #19 or #20 or #21 or #22 or #23 or #24 or #25 or #26 or #27 or #28 or #29 or #30 or #31 or #32 or #33 or #34 or #35 or #36
38	#11 and #37 with Cochrane Library publication date from Jan 2012 to Feb 2023
EMBASE	

Search filter: the economic facet of this search strategy has been informed by the NHS EED Economics filter, the SIGN Economic Studies search filter and the CADTH Economic search filter.	
1	("group and save$" or "group & save$" or "group-and-save$" or "group and screen$" or "group typing" or "group and hold" or "screen and hold").ti,ab,kw.
2	("typ$ and screen$" or "type-and-screen" or "type-and-screening" or "typ$ and antibody screen$" or "type and hold" or "serum hold").ti,ab,kw.
3	("type and cross" or "typing and crossmatching" or "cross-match$" or crossmatch$ or "cross match$" or "Cross-Match-to-Transfusion Ratio$" or "crossmatched-to-transfused ratio$" or "transfusion-to-cross-match" or "cross-testing").ti,ab,kw.
4	("antiglobulin crossmatch$" or "coagulation test$" or "hold clot" or "clot to hold" or "bb hold" or "hold tube" or "electronic remote blood issue" or "electronic cross-match" or "remote blood issue" or "ERBI" or "MSBOS" or "antibody screen$").ti,ab,kw.
5	(blood adj2 (typ$ or group$ or order$ or management or administ$ or component$ or requisition$ or overordering or "over-ordering" or wastage or bank or utilisation or utilization or reservation$ or product$ or schedule)).ti,ab,kw.
6	("blood support" or "ABO typing" or "ABO/Rh typ$" or "blood supply chain" or bloods or "PBM program$" or "PBM strateg$").ti,ab,kw.
7	Blood group typing/ or exp Blood group incompatibility/ or exp Blood group antigen/ or Blood safety/ or exp Blood transfusion/
8	or/1-7
9	(economic$ or cost or costs or costly or costing or microcosting or budget$ or save$ or saving$ or expensive or expense$ or expenditure$ or price$ or pricing or financ$ or fee or fees).ti,kf.
10	(economic$ or cost or costs or costly or costing or microcosting or budget$ or save$ or saving$ or expensive or expense$ or expenditure$ or price$ or pricing or financ$ or fee or fees).ab. /freq=2
11	("value for money" or "cost-effective$" or "micro-costing").ti,ab,kw.
12	((resource$ or service$) adj1 (utilisation or utilization)).ti,ab,kw.
13	Cost benefit analysis/ or Cost effectiveness analysis/ or Cost utility analysis/ or Cost of illness/ or Cost control/ or Cost minimization analysis/ or Economic evaluation/
14	Health care cost/ or Health care financing/ or Hospital cost/ or Cost/ or Budget/
15	Health economics/ or Economics/ or Microcosting/
16	or/9-15
17	8 and 16
18	conference abstract.pt.
19	conference abstract.st.
20	18 or 19
21	17 not 20
22	limit 21 to yr="2012-2023"
INAHTA International HTA Database via https://database.inahta.org/ Search filter: the economic facet of this search strategy has been informed by the NHS EED Economics filter, the SIGN Economic Studies search filter and the CADTH Economic search filter.	
1	"group and save*" or "group & save*" or "group-and-save*" or "group and screen*" or "group typing" or "group and hold" or "screen and hold" in ALL
2	"typ* and screen*" or "type-and-screen" or "type-and-screening" or "typ* and antibody screen*" or "type and hold" or "serum hold" in ALL

3	"type and cross" or "typing and crossmatching" or "cross-match*" or crossmatch* or "cross match*" or "Cross-Match-to-Transfusion Ratio*" or "crossmatched-to-transfused ratio*" or "transfusion-to-cross-match" or "cross-testing" in ALL
4	"antiglobulin crossmatch*" or "coagulation test*" or "hold clot" or "clot to hold" or "bb hold" or "hold tube" or "electronic remote blood issue" or "electronic cross-match" or "remote blood issue" or "ERBI" or "MSBOS" or "antibody screen*" in ALL
5	blood* in ALL
6	"Blood Group Incompatibility"[mhe] or "Blood Grouping and Crossmatching"[mh] or "Blood Group Antigens"[mhe] or "Blood Safety"[mh]
7	#6 OR #5 OR #4 OR #3 OR #2 OR #1
8	economic* or cost or costs or costly or costing or microcosting or budget* or save* or saving* or expensive or expense* or expenditure* or price* or pricing or financ* or fee or fees in ALL
9	"value for money" or "cost-effective*" or "micro-costing" or "resource* utilisation" or "service* utilisation" or "resource* utilization" or "service* utilization" in ALL
10	"Costs and Cost Analysis"[mhe] or "Cost-Benefit Analysis"[mh] or "Cost Savings"[mh] or "Cost Control"[mh] or "Cost Allocation"[mh] or "Cost of Illness"[mh] or "Cost Sharing"[mh]
11	"Health Care Costs"[mh] or "Hospital Costs"[mh] or "Health Expenditures"[mh] or "Medical Audit"[mh] or "Fees and Charges"[mhe] or Budgets[mhe] or "Direct Service Costs"[mh] or "Health Resources"[mh] or "Facilities and Services Utilization"[mh]
12	"Employer health costs"[mh] or Economics[mh] or "Economics, Hospital"[mhe] or "Economics, Medical"[mhe] or "Economics, Nursing"[mh] or "Economics, Pharmaceutical"[mh]
13	#12 OR #11 OR #10 OR #9 OR #8
14	#13 AND #7
15	Limit to year "2012-2023"
Medline (Ovid MEDLINE® Epub Ahead of Print, In-Process & Other Non-Indexed Citations, Ovid MEDLINE® Daily and Ovid MEDLINE®) 1946 to present. Searched via OVID. Search filter: the economic facet of the this search strategy has been informed by the NHS EED Economics filter, the SIGN Economic Studies search filter and the CADTH Economic search filter.	
1	("group and save$" or "group & save$" or "group-and-save$" or "group and screen$" or "group typing" or "group and hold" or "screen and hold").ti,ab,kw.
2	("typ$ and screen$" or "type-and-screen" or "type-and-screening" or "typ$ and antibody screen$" or "type and hold" or "serum hold").ti,ab,kw.
3	("type and cross" or "typing and crossmatching" or "cross-match$" or crossmatch$ or "cross match$" or "Cross-Match-to-Transfusion Ratio$" or "crossmatched-to-transfused ratio$" or "transfusion-to-cross-match" or "cross-testing").ti,ab,kw.
4	("antiglobulin crossmatch$" or "coagulation test$" or "hold clot" or "clot to hold" or "bb hold" or "hold tube" or "electronic remote blood issue" or "electronic cross-match" or "remote blood issue" or "ERBI" or "MSBOS" or "antibody screen$").ti,ab,kw.
5	(blood adj2 (typ$ or group$ or order$ or management or administ$ or component$ or requisition$ or overordering or "over-ordering" or wastage or bank or utilisation or utilization or reservation$ or product$ or schedule)).ti,ab,kw.
6	("blood support" or "ABO typing" or "ABO/Rh typ$" or "blood supply chain" or bloods or "PBM program$" or "PBM strateg$").ti,ab,kw.
7	"Blood Grouping and Crossmatching"/ or exp Blood Group Incompatibility/ or exp Blood Group Antigens/ or Blood Safety/
8	or/1-7

9	(economic$ or cost or costs or costly or costing or microcosting or budget$ or save$ or saving$ or expensive or expense$ or expenditure$ or price$ or pricing or financ$ or fee or fees).ti,ab,kf.
10	("value for money" or "cost-effective$" or "micro-costing").ti,ab,kw.
11	((resource$ or service$) adj1 (utilisation or utilization)).ti,ab,kw.
12	exp "Costs and Cost Analysis"/ or Cost-Benefit Analysis/ or Cost Savings/ or Cost Control/ or Cost Allocation/ or Cost of Illness/ or Cost Sharing/
13	Health Care Costs/ or Hospital Costs/ or Health Expenditures/ or Medical Audit/ or exp "Fees and Charges"/ or exp Budgets/ or Direct Service Costs/ or Health Resources/ or "Facilities and Services Utilization"/
14	Employer health costs/ or Economics/ or exp Economics, Hospital/ or exp Economics, Medical/ or Economics, Nursing/ or Economics, Pharmaceutical/
15	or/9-14
16	8 and 15
Transfusion Evidence Library (via http://www.transfusionevidencelibrary.com/) Search filter: the economic facet of the this search strategy has been informed by the NHS EED Economics filter, the SIGN Economic Studies search filter and the CADTH Economic search filter.	
1	economic* OR cost OR costs OR costly OR costing OR microcosting OR budget* OR save* OR saving* OR expensive OR expense* OR expenditure* OR price* OR pricing OR financ* OR fee OR fees OR "value for money" OR "cost-effective*" OR "micro-costing" (in main search box on homepage, no fields specified)
Web of Science Core Collection (via Clarivate Analytics at https://www.webofscience.com/wos/woscc/) Editions searched: Science Citation Index Expanded (SCI-EXPANDED), Conference Proceedings Citation Index – Science (CPCI-S). Search filter: the economic facet of the this search strategy has been informed by the NHS EED Economics filter, the SIGN Economic Studies search filter and the CADTH Economic search filter.	
1	TS=("group and save*" OR "group & save*" OR "group-and-save*" OR "group and screen*" OR "group typing" OR "group and hold" OR "screen and hold")
2	TS=("typ* and screen*" OR "type-and-screen" OR "type-and-screening" OR "typ* and antibody screen*" OR "type and hold" OR "serum hold")
3	TS=("type and cross" OR "typing and crossmatching" OR "cross-match*" OR crossmatch* or "cross match*" OR "Cross-Match-to-Transfusion Ratio*" OR "crossmatched-to-transfused ratio*" OR "transfusion-to-cross-match" OR "cross-testing")
4	TS=("antiglobulin crossmatch*" OR "coagulation test*" OR "hold clot" OR "clot to hold" OR "bb hold" OR "hold tube" OR "electronic remote blood issue" OR "electronic cross-match" OR "remote blood issue" OR "ERBI" OR "MSBOS" OR "antibody screen*")
5	TS=(blood NEAR/2 (typ* OR group* OR order* OR management OR administ* OR component* OR requisition* OR overordering OR "over-ordering" OR wastage OR bank OR utilisation OR utilization OR reservation* OR product* OR schedule))
6	TS=("blood support" OR "ABO typing" OR "ABO/Rh typ*" OR "blood supply chain" OR "bloods" OR "PBM program*" OR "PBM strateg*")
7	#1 OR #2 OR #3 OR #4 OR #5 OR #6
8	TS=(economic* OR cost OR costs OR costly OR costing OR microcosting OR budget* OR save* OR saving* OR expensive OR expense* OR expenditure* OR price* OR pricing OR financ* OR fee OR fees OR "value for money" OR "cost-effective*" OR "micro-costing")

9	TS=((resource* OR service*) NEAR/1 (utilisation or utilization))
10	#8 OR #9
11	PY=(2012-2023)
12	#7 AND #10 AND #11 [Indexes=SCI-EXPANDED, CPCI-S]

Table 2: Extraction form (RedCap)

Record ID
Survey Identifier
Survey Timestamp
Rayyan ID
Reviewer initials
Country What is the geographic location of the study? if not available, please enter the country affiliation of the first author
If Other, please specify:
AimWhat is the aim of the study?
Study design (choice=Retrospective study)
Study design (choice=Cross-sectional)
Study design (choice=Economic evaluation)
Study design (choice=Cost analysis)
Study design (choice=Microcosting)
Study design (choice=Other study_design_oth
Other
Time frame (horizon)What are the start and end dates (years) of data collection?
Clinical area (main medical area/condition) (choice=Allergy and immunology)
Clinical area (main medical area/condition) (choice=Anesthesiology)
Clinical area (main medical area/condition) (choice=Dermatology)
Clinical area (main medical area/condition) (choice=Diagnostic radiology)
Clinical area (main medical area/condition) (choice=Emergency medicine)
Clinical area (main medical area/condition) (choice=Family medicine)
Clinical area (main medical area/condition) (choice=Internal medicine)
Clinical area (main medical area/condition) (choice=Medical genetics)
Clinical area (main medical area/condition) (choice=Neurology)
Clinical area (main medical area/condition) (choice=Nuclear medicine)
Clinical area (main medical area/condition) (choice=Obstetrics and gynecology)
Clinical area (main medical area/condition) (choice=Ophthalmology)
Clinical area (main medical area/condition) (choice=Orthopaedic)
Clinical area (main medical area/condition) (choice=Pathology)
Clinical area (main medical area/condition) (choice=Pediatrics)
Clinical area (main medical area/condition) (choice=Physical medicine and rehabilitation)
Clinical area (main medical area/condition) (choice=Preventive medicine)
Clinical area (main medical area/condition) (choice=Psychiatry)
Clinical area (main medical area/condition) (choice=Radiation oncology)
Clinical area (main medical area/condition) (choice=Surgery)
Clinical area (main medical area/condition) (choice=Urology)

Clinical area (main medical area/condition) (choice=Other)
Other
Sample size How many participants were included in the study?
Population - age
Population - sex (choice=Male)
Population - sex (choice=Female)
Population - sex (choice=Both)
Settings the study conducted in a single or multiple centres? (choice=Single centre)
Settings the study conducted in a single or multiple centres? (choice=Multiple centres, please specify number n_hospitals)
Number centres
Clinical setting (choice=Elective surgery)
Clinical setting (choice=Non-surgical)
Clinical setting (choice=Emergency/Urgent)
Clinical setting (choice=Other clinical_setting_oth)
Other clinical setting
SurgeryWhat surgery was provided? (Enter name(s) of surgery-ies)
Blood sampling process What type of blood sampling process was analysed in the study? (choice=Group and save (also type and screen, or type and cross))
Blood sampling process What type of blood sampling process was analysed in the study? (choice=Crossmatch)
Blood sampling process What type of blood sampling process was analysed in the study? (choice=Other blood_sampling_oth)
If Other, please specify:
Blood test Which pre-operative blood tests were performed? (choice=Blood Group (ABO) - part of group and save)
Blood test Which pre-operative blood tests were performed? (choice=RhD typing - part of group and save)
Blood test Which pre-operative blood tests were performed? (choice=Antibody screen/detection/identification - crossmatch, typically performed after G&S)
Blood test Which pre-operative blood tests were performed? (choice=Other(s) blood_test_oth)
Electronic Issue? Electronic Issue is the process whereby blood is issued to a patient without serological crossmatching.
Other
Main findings
Study limitations
Currency
Other
Currency year
Sources or methods used for cost information (choice=Literature)
Sources or methods used for cost information (choice=Not stated)
Sources or methods used for cost information (choice=Internal costing)
Sources or methods used for cost information (choice=Reference cost)
Sources or methods used for cost information (choice=Tariff)
Sources or methods used for cost information (choice=Other sources_costing_oth)
Sources for costing
Was discounting applied?

Group and Save - time
Group and Save - total cost
Group and save - notes
Crossmatch(XM) - add on (not electronic, e.g.:serological) - time
Crossmatch(XM) - add on (not electronic, e.g.:serological) - total cost
Crossmatch(XM) - add on (not electronic, e.g.:serological) - notes
Crossmatch (XM) - add on (electronic issue) - time
Crossmatch (XM) - add on (electronic issue) - tot cost
Crossmatch (XM) - add on (electronic issue) - notes
GS + XM (not electronic) - time
GS + XM (not electronic) - tot cost
GS + XM (not electronic) - notes
GS + XM (electronic) - time
GS + XM (electronic) - tot cost
GS + XM (electronic) - notes
Blood Group (ABO) - time
Blood Group (ABO) - tot cost
Blood Group (ABO) - notes
Antibody screen/detection/identification - Time
Antibody screen/detection/identification - tot cost
Antibody screen/detection/identification - notes
RhD typing - Time
RhD typing - tot cost
RhD typing - notes
Other test - Time
Other test - tot cost
Other test - notes
Sample collection - Time
Sample collection - tot cost
Sample collection - notes
Sample analysis - Time
Sample analysis - tot cost
Sample analysis - notes
Crossmatching (not electronic) - Time
Crossmatching (not electronic) - tot cost
Storage blood product - Time
Crossmatching (not electronic) - notes
Crossmatching (electronic) - tot cost
Crossmatching (electronic) - time
Crossmatching (electronic) - notes
Storage blood product - tot cost
Storage blood product - notes
Transport - Time
Transport - tot cost

Transport - notes
Disposal - Time
Disposal - tot cost
Disposal - notes
Stock control - Time
Stock control - tot cost
Stock control - notes
Audit trail for blood products - Time
Audit trail for blood products - tot cost
Audit trail for blood products - notes
Other activity - tot cost
Other activity - time
Other activity - notes
Gloves
Tourniquets
Needle
Alcohol
Plaster
Vacutainer
Equipment
All consumables
Other consumables
Consumables - notes
Staff Which staff cadres were involved in taking and or analysing blood? (choice=Nurse)
Staff Which staff cadres were involved in taking and or analysing blood? (choice=Medical doctor)
Staff Which staff cadres were involved in taking and or analysing blood? (choice=Student/Intern)
Staff Which staff cadres were involved in taking and or analysing blood? (choice=Blood bank manager)
Staff Which staff cadres were involved in taking and or analysing blood? (choice=Lab scientist/technician)
Staff Which staff cadres were involved in taking and or analysing blood? (choice=Not stated)
Staff Which staff cadres were involved in taking and or analysing blood? (choice=Other staff_cadre_oth)
Other
Other cost results (please report here aggregate costs if available, or any other cost information)
Reviewer comments

Supplementary material B - Results

Table 1: Unit cost for Group and Save (GS).

Study	*Currency (year)*	*Study design*	*Cost per test (GS) +*	*GS components – cost per test +*				*Cost per patient (GS) +*	*Notes*	*Costing method*
				Blood Group (ABO)	*RhD typing*	*Antibody screen*	*Antibody identification*			
Adams, Baldwin (1)	USA $ (2019)	Case series	16.00						Range: (8-40)	Reference cost
Adams, Cahill (2)	USA $ (2019)	Case series	16.00						Range: (8-40)	Reference cost
Al-Musawi, Reece (3)	UK £ (2022)	Case series	13.50	13.50				27.00	Two samples per patient	Internal costing
Alyacoubi, Taj (4)	UK £ (2021)	Case series	12.00							Not stated
Azizgolshani, Porter (5)	USA $ (2020)	Cohort	646.00	192.00			283.00		Institutional charges (Centers for Medicare & Medicaid Services (CMS) schedule, same as [50]	Internal costing
Baig, Sarma (6)	UK £ (2021)	Cohort	18.39					36.78	Two samples per patient	Not stated
Bamford, Hall (7)	UK £ (2014)	Case note review	7.98							Internal costing
Barreto, Singh (8)	USA $ (2017)	Cohort	3.70							Internal costing
Barrett-Lee, Vatish (9)	UK £ (2018)	Case series	3.29							Internal costing

Study	Currency (year)	Study design	Cost per test (GS) [+]	GS components – cost per test [+]				Cost per patient (GS) [+]	Notes	Costing method
				Blood Group (ABO)	RhD typing	Antibody screen	Antibody identification			
Batt, Chambers (10)	UK £ (2021)	Case series	13.88					27.76		Internal costing
Bawazir and Dakkam (11)	USA $ (2020)	Case-control		2.65					Reverse grouping	Internal costing
Christopher, Verhey (12)	USA $ (2021)	Case series		106.97	32.89		51.41	191.27		Reference cost
Chu, Wagholikar (13)	Australian $ (2012)	Quasi-experimental before-and-after	43.13							Reference cost
Compton, Szklarski (14)	USA $ (2018)	Case series	30.73-40.5						Cost based on phlebotomist or registered nurse time	Not stated
Einerson, Stehlikova (15)	USA $ (2015)	Economic evaluation	72.54 (31-160)*							Literature
Fadel, Patel (16)	UK £ (2021)	Systematic Review	18.99 (15-21.3)*						Mean of values from literature	Literature
Farrell, Hall (17)	UK £ (2019)	Case series	17.50					35.00	Two samples per patient	Internal costing

Study	*Currency (year)*	*Study design*	*Cost per test (GS)* [+]	*GS components – cost per test* [+]				*Cost per patient (GS)* [+]	*Notes*	*Costing method*
				Blood Group (ABO)	*RhD typing*	*Antibody screen*	*Antibody identification*			
Fernandez, Cronin (18)	USA $ (2012)	Chart review	45							Internal costing
Finley, Fay (19)	USA $ (2021)	Cohort	646.00	192.00			283.00		Institutional charges (Centers for Medicare & Medicaid Services (CMS) schedule, same as [21]	Internal costing & Reference cost
Fong, Rodriguez (20)	UK £ (2018)	Case series	20.00						Two samples per patient	Literature
Frank, Rothschild (21)	USA $ (2012)	Case series	7.56						Hospital charge to patients: 37	Internal costing
Garg, Coleman (22)	UK £ (2010)	Chart review	10.00							Not stated
Parker, Mahawar (23)	UK £ (2011)	Case series	5.06							Internal costing
Patel, Edwards (24)	USA $ (2016)	Economic evaluation	87.50 (75-100) *						Estimated range given, not specific value. Also, analysis performed based on hospital charge, not actual cost of reagents, disposable items, and personnel time.	Literature

Study	Currency (year)	Study design	Cost per test (GS) [+]	GS components – cost per test [+]				Cost per patient (GS) [+]	Notes	Costing method
				Blood Group (ABO)	RhD typing	Antibody screen	Antibody identification			
Pham, Kim (25)	USA $ (2013)	Economic evaluation		26.46		104.16	32.92		Antibody panel interpretation: 50, Technologist time: 50/h	Internal costing
Rayborn, Turner (26)	USA $ (2013)	Case series	75-100[*]						Does not include cost of blood bank inventory management.	Literature
Reppucci, Meier (27)	USA $ (2021)	Chart review	436.00							Internal costing
Rinehart, Lee (28)	USA $ (2014)	Case series	24.50						Including laboratory reagents, technician time, and equipment use	Internal costing
Saringcarinkul and Chuasuwan (29)	USA $ (2015)	Case series						6.52	Does not cover all the salaries, infrastructure, training, reagents, and supplies for donor blood collection, storage, and testing.	Internal costing
Smith, Falconer (30)	UK £ (2016)	Case series	23.52						Two samples per patient.	Internal costing
Spillinger, Allen (31)	USA $ (2015)	Economic evaluation	72.54 (31-160)[*]							Literature [55]

Study	Currency (year)	Study design	Cost per test (GS) +	GS components – cost per test +				Cost per patient (GS) +	Notes	Costing method
				Blood Group (ABO)	RhD typing	Antibody screen	Antibody identification			
Stangenberg, Curran (32)	USA $ (2013)	Case-control	350.00							Internal costing
Steele, Herman (33)	USA $ (2019)	Chart review					211			Internal costing
Stokes, Wordsworth (34)	UK £ (2015)	Micro costing	8.4							Internal costing
Strockbine, Gehrie (35)	USA $ (2018)	Quasi-experimental before-and-after	1.86						Direct costs only: testing material and reagents	Internal costing
Tay, Woo (36)	Singapore dollar (2016)	Chart review	27.70							Internal costing
Thomson, Ross (37)	UK £ (2013)	Chart review	18.39						Exclude laboratory costs	Internal costing
Tjaden, Codispoti (38)	USA $ (2019)	Chart review	113.39	7.39	23.00			193.39		Internal costing
Tunthanathip, Sae-Heng (39)	USA $ (2022)	Cohort	10.34							Not stated

Study	Currency (year)	Study design	Cost per test (GS) [+]	GS components – cost per test [+]				Cost per patient (GS) [+]	Notes	Costing method
				Blood Group (ABO)	RhD typing	Antibody screen	Antibody identification			
Turcotte, Holbert (40)	USA $ (2022)	Case series	38.00	15.00			23.00			Internal costing
Vestermark, Rowe (41)	USA $ (2019)	Case series		106.97	32.89		51.41	191.27	Centers for Medicaid and Medicare Services (CMS) 2019 payment rates	Reference cost
Volin, Daniel (42)	USA $ (2015)	Economic evaluation	72.54 (31-160) [*]						Same reported cost as [55] and [41]	Literature
Wilson, Young (43)	UK £ (2016)	Chart review	20.00							Not stated
Zhao, Dahlen (44)	USA $ (2018)	Case series		43.00		89.00				Not stated
Hainsworth, Tracy (45)	UK £ (2018)	Case series	1.65							Internal costing
Hall, Pattenden (46)	UK £ (2013)	Case series	10.00							Internal costing
Hasan, Khan (47)	USA $ (2018)	Case series								Internal costing
Hildebrand, Binnie (48)	UK £ (2012)	Case series	40.6						Exclude laboratory staff costs	Internal costing
Kacker, Ness (49)	USA $ (2012)	Economic evaluation		7.71 (5.78-9.64) [*]	7.71 (5.78, 9.64) [*]	14.95 (11.21, 18.69) [*]	24.77 (18.58, 30.96) [*]		Other GS tests: Direct Antiglobulin Test (for patients with positive screen only) $7.71 (5.78,	Reference cost

Study	Currency (year)	Study design	Cost per test (GS) [+]	GS components – cost per test [+]				Cost per patient (GS) [+]	Notes	Costing method
				Blood Group (ABO)	RhD typing	Antibody screen	Antibody identification			
									9.64); Elution (for patients with positive DAT only) $24.77 (18.58, 30.96); Adsorption Study (for patients with positive screen indicating Auto AB only) $24.77 (18.58, 30.96); Negative Antigens (per antigen negative, per unit) $80 (60, 100)	
Kirschen, Dayton (50)	USA $ (2021)	Cohort	75-100							Literature
Kretzmer, Damola (51)	UK £ (2022)	Chart review	14 (4.58-23.52)*						Value extrapolated as a mean of values from literature	Literature
Kwok, White (52)	UK £ (2013)	Audit	2.20							Internal costing
Machado, Loureiro (53)	Euro (2016)	Chart review	10.00							Internal costing
Mann, Sim (54)	UK £ (2012)	Case series	3.48							Internal costing

Study	Currency (year)	Study design	Cost per test (GS) [+]	GS components – cost per test [+]				Cost per patient (GS) [+]	Notes	Costing method
				Blood Group (ABO)	RhD typing	Antibody screen	Antibody identification			
McKenna and Abdelaal (55)	UK £ (2021)	Chart review	25.41							Internal costing
O'Donnell, Shean (56)	USA $ (2018)	Cohort	325.00						Medicare reimbursement is $136.36 for a simple type and screen, with an additional $209.49 if any antibodies are positive	Internal costing & Reference cost
Mazonson, Efrusy (57)	USA $ (2014)	Case series					7.00			Internal costing
Mafirakureva, Nyoni (58)	USA $ (2013)	Macro cost analysis	17.88						Included costs of screening for transfusion-transmissible infections and blood grouping, 95% Confidence interval: 17.32-18.42	Reference cost
Obaidallah, Downie (59)	Canadian $ (2022)	Chart review						9.83	Sum of cost for collecting and processing a second blood sample for ABO	Internal costing

Legend: [*] range (min-max) [+] 95% confidence interval, [+] cost reported in the original currency value and year. GS: Group and Save

Table 2: Unit cost for Crossmatch (CM) test.

Study	*Currency (year)*	*Study design*	*Cost per test*[*]	*Cost of CM components*[*]		*Notes*	*Costing method*
				Indirect antiglobulin	**Electronic**		
Bamford, Hall (7)	UK £ (2014)	Case note review	780				Internal costing
Bawazir and Dakkam (11)	USA $ (2020)	Case-control		1.35		Cost of ID gel cards + reagents of Liss/Coomb bs (0.98+0.37)	Internal costing
Chu, Wagholikar (13)	Australian $ (2012)	Quasi-experimental before-and-after	99.01				Reference cost
Chung, Hur (60)	USA $ (2018)	Cohort	1.44		2.7		Literature
Cushing, DeSimone (61)	USA $ (2017)	Cohort		29.8		Cost of reagent and labour	Internal costing
Einerson, Stehlikova (15)	USA $ (2015)	Economic evaluation	24.9			Range: (13-111)	Literature
Fernandez, Cronin (18)	USA $ (2012)	Chart review	60				Internal costing

Study	*Currency (year)*	*Study design*	*Cost per test*[*]	*Cost of CM components*[*]		*Notes*	*Costing method*
				Indirect antiglobulin	**Electronic**		
Frank, Rothschild (21)	USA $ (2012)	Case series	10.61			Hospital charge to patients: 52	Internal costing
Pham, Kim (25)	USA $ (2013)	Economic evaluation	60		20		Internal costing
Razavi, Carter (62)	USA $ (2013)	Quasi-experimental before-and-after	7.21		6.72		Internal costing
Reppucci, Meier (27)	USA $ (2021)	Chart review	632				Internal costing
Rinehart, Lee (28)	USA $ (2014)	Case series	5.50				Internal costing
Saringcarinkul and Chuasuwan (29)	USA $ (2015)	Case series	3.59			Does not include salaries, infrastructure, training, reagents, and supplies for donor blood collection, storage, and testing.	Internal costing
Shafie, Wong (63)	Malaysian Ringgit (2019)	Economic evaluation	11			Federal Government Malaysia. FEES (Medical) (Cost of services) ORDER, 2014 [	Reference cost
Shiru, Abdul (64)	USA $ (2018)	Chart review	8.40				Internal costing
Stokes, Wordsworth (34)	UK £ (2015)	Microcosting	8.07				Internal costing
Ural, Volpi-Abadie (65)	USA $ (2016)	Case series	14				Internal costing
Zhao, Dahlen (44)	USA $ (2018)	Case series	31				Reference cost

Study	*Currency (year)*	*Study design*	*Cost per test*[*]	*Cost of CM components*[*]		*Notes*	*Costing method*
				Indirect antiglobulin	**Electronic**		
Hall, Pattenden (46)	UK £ (2013)	Case series	7				Internal costing
Hasan, Khan (47)	USA $ (2018)	Case series	48.40				Internal costing
Indelen, Kizmaz (66)	USA $ (2018)	Microcosting	7.21				Internal costing
Kacker, Ness (49)	USA $ (2012(	Economic evaluation		24.77 [*]	14.95[**]	AHG test, [*]Range: (18.58- 30.96) [**]Range: (11.21- 18.69)	Reference cost
Kleineruschkamp, Meybohm (67)	Euro (2019)	Systematic Review	11.66				Literature
Kwok, White (52)	UK £ (2013)	Audit			3.75		Internal costing
Mann, Sim (54)	UK £ (2012)	Case series	137.22			Include cost of transfusion	Internal costing
O'Donnell, Shean (56)	USA $ (2018)	Cohort	126-175				Internal costing
Hildebrand, Binnie (48)	UK £ (2012)	Case series	30				Internal costing

Legend: [*]costs are reported in the original currency value and year

Table 3: Studies reporting overall unit cost for Groupe and Save (GS) and Crossmatch (CM)

Study	*Currency*	*Study design*	*Cost per test [*](GS&CM)*	*Cost per patient (GS&CM)[*]*	*Notes*	*Costing method*
Barreto, Singh (8)	USA $ (2017)	Cohort	5.90			Internal costing
Barth, Weiss (68)	USA $ (2018)	Case series	625.39		Range: (± 158.31)	Literature
Shafie, Wong (63)	Malaysian Ringgit (2019)	Economic evaluation	11			Not stated

Straub, Bauer (69)	Euro (2015)	Economic evaluation		46.75		Literature
Tay, Woo (36)	Singapore dollar (2016)	Chart review	57.10			Internal costing
Ural, Volpi-Abadie (65)	USA $ (2016)	Case series		36.87		
Volin, Daniel (42)	USA $ (2015)	Economic evaluation	24.9		Range: (13-111)	Literature
Yang, Singhal (70)	Canadian dollars (2015)	Chart review	40.25		Does not include indirect costs	Internal costing
Haleem, Thimmaiah (71)	UK £ (2022)	Case series	154			Not stated

Legend: [*]costs are reported in the original currency and year, GS: Group and Save, CM: Crossmatch

Table 4: Studies with economic focus

Study	***Country***	***Aim***	***Group and save/Crossmatch as main objective (yes/no)***	***Contextual study design***	***Type of economic evaluation***	***Economic evaluation model***	***Main findings***
Einerson, Stehlikova (15)	USA	To evaluate the cost-effectiveness of common obstetric transfusion preparedness strategies to prevent emergency-release transfusions.	yes	Economic evaluation	Cost-effectiveness	Decision Tree	In obstetric haemorrhage preparedness, universal type and screen was never cost-effective, with no-testing or selective strategies for high-risk patients offering far lower cost per emergency-release transfusion prevented.
Indelen, Kizmaz (66)	Turkey	To analyse the cost of the entire transfusion process in Turkey including evaluation of the cost of	no	Microcosting	NA	NA	The hospital cost of crossmatch was $7.21 and ABO + Rh typing $5.91, forming part of the total $240–$251 per erythrocyte suspension unit.

		transfusion from the perspective of hospital management and determination of savings achieved with the transfusion improvement program					
Kacker, Ness (49)	USA	To evaluate the cost-effectiveness of various antigen-matching strategies for chronically transfused sickle cell disease patients	no	Economic evaluation	Cost-effectiveness	Markov	For sickle cell disease, prospective extended antigen matching including ABO/Rh and antibody screen substantially reduced alloimmunisation but at very high incremental cost per event averted.
Mafirakureva, Nyoni (58)	Zimbabwe	To assess the unit costs of producing blood in Zimbabwe using an activity-based costing method	no	Macro cost analysis	NA	NA	Blood grouping and crossmatching accounted for US$17.88 (15.1%) of the US$118–$131 cost of producing a unit of blood or red cells.
Patel, Edwards (24)	USA	To investigate the cost saving effect of increasing group and save sample storage interval from 7 to 14 days for patients with no history of transfusion or pregnancy in the past 3 months and no history of clinically significant RBC antibodies.	yes	Economic evaluation	Cost benefit	No model	Extending preoperative type and screen sample validity from 7 to 14 days reduced repeat testing and saved an estimated $38,770 annually, with greater savings at longer intervals.
Pham, Kim (25)	USA	To analyse the cost-benefit of providing phenotypically matched vs. traditional type and cross every 72 h in patients with placenta	yes	Economic evaluation	Cost benefit	Markov	Preparing phenotypically matched RBC units at admission was found to be more cost-beneficial compared to the traditional method of T&C every 72 hours, provided the cost for the matched unit was less than $857.67 USD

		accreta and/or placenta previa who are admitted to the hospital prior to scheduled delivery.					
Shafie, Wong (63)	Malaysia	To estimate the lifetime costs of transfusion-dependent thalassaemia patients in Malaysia from a societal perspective.	no	Economic evaluation	Cost analysis	Markov	In transfusion-dependent thalassaemia, blood group and crossmatch testing cost $2.70 per transfusion, contributing to 13.1% of lifetime healthcare costs.
Spillinger, Allen (31)	USA	To evaluate the cost-effectiveness of obtaining preoperative type and screens for common endonasal skull base procedures, and determine patient and hospital factors associated with receiving blood transfusion	yes	Economic evaluation	Cost-effectiveness	Decision Tree	For endonasal skull base surgery, routine preoperative type and screen was not cost-effective, becoming justified only when transfusion risk exceeded 4.12%.
Stokes, Wordsworth (34)	UK	To generate comprehensive estimates of the costs of administering transfusions for the UK National Health Service	no	Microcosting	NA	NA	In two UK hospitals, the average cost of a group and screen was £8.40, with 2.3 tests performed per unit transfused, making test frequency a key driver of laboratory costs.
Straub, Bauer (69)	Germany	To analyse the cost-effectiveness Point-of-Care coagulation testing using multiple electrode aggregometry compared to standard laboratory testing in	no	Economic evaluation	Cost-effectiveness	Decision Tree	In cardiac surgery patients, a model including preoperative costs such as blood grouping and crossmatching found that point-of-care coagulation testing reduced transfusions and complications, yielding €288 lower total cost per patient compared with standard laboratory testing.

		cardiac surgery patient					
Volin, Daniel (42)	USA	To evaluate the cost-effectiveness of obtaining a preoperative type and screen for common urologic procedures.	yes	Economic evaluation	Cost-effectiveness	Decision Tree	In common urologic procedures, routine preoperative type and screen was not cost-effective unless transfusion risk exceeded 4.12%, with selective or postoperative testing suggested as preferable.

Table 5: Detail of surgical specialties

Surgical speciality (n=55)	N studies	%
Orthopaedic surgery	11	20.0
General surgery	8	14.5
Neurosurgery	4	7.3
Obstetrics and gynaecology	4	7.3
Vascular surgery	4	7.3
Cardiothoracic surgery	3	5.5
Anaesthesiology, surgery	2	3.6
Emergency general surgery	2	3.6
Paediatric orthopaedic surgery	2	3.6
Paediatric surgery	2	3.6
Thoracic surgery	2	3.6
Urologic surgery	2	3.6
Bariatric surgery	1	1.8
Breast surgery, oncology	1	1.8
Cardiac and non-cardiac surgery	1	1.8
Colorectal surgery	1	1.8
Gynaecologic oncology surgery	1	1.8
Hepatopancreatobiliary surgery	1	1.8
Neurosurgery, oncology	1	1.8
Oral and maxillofacial surgery	1	1.8
Urologic and surgical oncology	1	1.8

Table 6: Cost results by components (mean)

	N studies	Mean (SD) (£, 2022)
Group and save (n=59)		
Unit cost	**48**	**58.2 (105.9)**
Cost by component		
Blood typing (ABO)	6	35.1 (30.6)
RhD typing	4	17.6 (7.0)
Antibody screen	5	36.9 (32.4)
Antibody identification	8	90.1 (75.9)
Cost per patient	9	90.3 (78.1)
Crossmatch (n=27)		
Unit cost	**23**	**41.4 (90.9)***
Cost by component		
Indirect antiglobulin	3	14.8 (9.8)
Electronic	5	7.8 (5.6)
Group and save + Crossmatch (n=7)		
Unit cost	7	106.2 (155.9)
Cost per patient	2	44.3 (7.6)

Legend: *SD: standard deviation. *Unit cost by Mann et al. includes the cost of transfusion and it was excluded from the mean calculation.*

Table 7: PRISMA Checklist

Section and Topic	Item #	Checklist item	Location where item is reported (section)
TITLE			
Title	1	Identify the report as a systematic review.	title
ABSTRACT			
Abstract	2	See the PRISMA 2020 for Abstracts checklist.	
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of existing knowledge.	1
Objectives	4	Provide an explicit statement of the objective(s) or question(s) the review addresses.	1
METHODS			
Eligibility criteria	5	Specify the inclusion and exclusion criteria for the review and how studies were grouped for the syntheses.	2
Information sources	6	Specify all databases, registers, websites, organisations, reference lists and other sources searched or consulted to identify studies. Specify the date when each source was last searched or consulted.	2

Section and Topic	Item #	Checklist item	Location where item is reported (section)
Search strategy	7	Present the full search strategies for all databases, registers and websites, including any filters and limits used.	2 and Supp material A
Selection process	8	Specify the methods used to decide whether a study met the inclusion criteria of the review, including how many reviewers screened each record and each report retrieved, whether they worked independently, and if applicable, details of automation tools used in the process.	2
Data collection process	9	Specify the methods used to collect data from reports, including how many reviewers collected data from each report, whether they worked independently, any processes for obtaining or confirming data from study investigators, and if applicable, details of automation tools used in the process.	2
Data items	10a	List and define all outcomes for which data were sought. Specify whether all results that were compatible with each outcome domain in each study were sought (e.g. for all measures, time points, analyses), and if not, the methods used to decide which results to collect.	2 and Supp material A
	10b	List and define all other variables for which data were sought (e.g. participant and intervention characteristics, funding sources). Describe any assumptions made about any missing or unclear information.	2 and Supp material A
Study risk of bias assessment	11	Specify the methods used to assess risk of bias in the included studies, including details of the tool(s) used, how many reviewers assessed each study and whether they worked independently, and if applicable, details of automation tools used in the process.	2 and Supp. material
Effect measures	12	Specify for each outcome the effect measure(s) (e.g. risk ratio, mean difference) used in the synthesis or presentation of results.	2
Synthesis methods	13a	Describe the processes used to decide which studies were eligible for each synthesis (e.g. tabulating the study intervention characteristics and comparing against the planned groups for each synthesis (item #5)).	2
	13b	Describe any methods required to prepare the data for presentation or synthesis, such as handling of missing summary statistics, or data conversions.	2
	13c	Describe any methods used to tabulate or visually display results of individual studies and syntheses.	2
	13d	Describe any methods used to synthesize results and provide a rationale for the choice(s). If meta-analysis was performed, describe the model(s), method(s) to identify the presence and extent of statistical heterogeneity, and software package(s) used.	2
	13e	Describe any methods used to explore possible causes of heterogeneity among study results (e.g. subgroup analysis, meta-regression).	2
	13f	Describe any sensitivity analyses conducted to assess robustness of the synthesized results.	2
Reporting bias assessment	14	Describe any methods used to assess risk of bias due to missing results in a synthesis (arising from reporting biases).	2 and Suppl material
Certainty assessment	15	Describe any methods used to assess certainty (or confidence) in the body of evidence for an outcome.	2 and Supp material B
RESULTS			
Study selection	16a	Describe the results of the search and selection process, from the number of records identified in the search to the number of studies included in the review, ideally using a flow diagram.	3
	16b	Cite studies that might appear to meet the inclusion criteria, but which were excluded, and explain why they were excluded.	Figure 1
Study characteristics	17	Cite each included study and present its characteristics.	3, tables 1-2 and Supp material B
Risk of bias in studies	18	Present assessments of risk of bias for each included study.	-

Section and Topic	Item #	Checklist item	Location where item is reported (section)
Results of individual studies	19	For all outcomes, present, for each study: (a) summary statistics for each group (where appropriate) and (b) an effect estimate and its precision (e.g. confidence/credible interval), ideally using structured tables or plots.	Figure 2,3 and Supp material B
Results of syntheses	20a	For each synthesis, briefly summarise the characteristics and risk of bias among contributing studies.	4
	20b	Present results of all statistical syntheses conducted. If meta-analysis was done, present for each the summary estimate and its precision (e.g. confidence/credible interval) and measures of statistical heterogeneity. If comparing groups, describe the direction of the effect.	3
	20c	Present results of all investigations of possible causes of heterogeneity among study results.	4
	20d	Present results of all sensitivity analyses conducted to assess the robustness of the synthesized results.	Figure 1 and 2 Supp material B
Reporting biases	21	Present assessments of risk of bias due to missing results (arising from reporting biases) for each synthesis assessed.	-
Certainty of evidence	22	Present assessments of certainty (or confidence) in the body of evidence for each outcome assessed.	4 and Supp material B
DISCUSSION			
Discussion	23a	Provide a general interpretation of the results in the context of other evidence.	4
	23b	Discuss any limitations of the evidence included in the review.	4
	23c	Discuss any limitations of the review processes used.	4
	23d	Discuss implications of the results for practice, policy, and future research.	5
OTHER INFORMATION			
Registration and protocol	24a	Provide registration information for the review, including register name and registration number, or state that the review was not registered.	2
	24b	Indicate where the review protocol can be accessed, or state that a protocol was not prepared.	2
	24c	Describe and explain any amendments to information provided at registration or in the protocol.	-
Support	25	Describe sources of financial or non-financial support for the review, and the role of the funders or sponsors in the review.	Acknowledgement
Competing interests	26	Declare any competing interests of review authors.	Conflict of interest
Availability of data, code and other materials	27	Report which of the following are publicly available and where they can be found: template data collection forms; data extracted from included studies; data used for all analyses; analytic code; any other materials used in the review.	-

Table 8: Quality appraisal – Cohort studies

Questions from CASP (cohort study checklist) *(72)*	Did the study address a clearly focused issue?	Was the cohort recruited in an acceptable way?	Was the exposure accurately measured to minimise bias?	Was the outcome accurately measured to minimise bias?	Have the authors identified all important confounding factors?	Have they taken account of the confounding factors in the design and/or analysis?	Was the follow up of subjects complete enough?	Was the follow up of subjects long enough?
Kirschen, Dayton (50)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Kwok, White (52)	Yes	Yes	Yes	Yes	Can't tell	No	Yes	Yes
Machado, Loureiro (53)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
McKenna and Abdelaal (55)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
O'Donnell, Shean (56)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Steele, Herman (33)	Yes	Yes	Yes	Yes	Yes	Can't tell	Yes	Yes
Stokes, Wordsworth (34)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Tay, Woo (36)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Thomson, Ross (37)	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes
Finley, Fay (19)	Yes	Yes	Yes	Yes	Can't tell	Can't tell	Yes	Yes
Strockbine, Gehrie (35)	Yes	Yes	Yes	Yes	Can't tell	Can't tell	Yes	Yes
Razavi, Carter (62)	Yes	Yes	Yes	Yes	Can't tell	Can't tell	Yes	Yes
Indelen, Kizmaz (66)	Yes	Yes	Yes	Yes	No	No	Yes	Yes
Wilson, Young (43)	Yes	Yes	Yes	Yes	Can't tell	No	Yes	Yes
Shiru, Abdul (64)	Yes	Yes	Yes	Yes	No	No	Yes	Yes

Stangenberg, Curran (32)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Tjaden, Codispoti (38)	Yes	Yes	Yes	Yes	Can't tell	Can't tell	Yes	Yes
Vestermark, Rowe (41)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Tunthanathip, Sae-Heng (39)	Yes	Yes	Yes	Yes	Can't tell	Can't tell	Yes	Yes
Barreto, Singh (8)	Yes	Yes	Yes	Yes	Can't tell	No	Can't tell	Yes
Chu, Wagholikar (13)	Yes	Yes	Yes	Yes	Can't tell	No	Yes	Yes
Obaidallah, Downie (59)	Yes	Yes	Yes	Yes	Can't tell	No	Can't tell	Yes
Garg, Coleman (22)	Yes	Yes	Yes	Yes	Can't tell	No	Yes	Yes
Reppucci, Meier (27)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Bawazir and Dakkam (11)	Yes	Yes	Yes	Can't tell	Can't tell	No	Can't tell	Yes
Yang, Singhal (70)	Yes	Yes	Yes	Yes	Can't tell	No	Can't tell	Can't tell
Kretzmer, Damola (51)	Yes	Yes	Yes	Yes	Can't tell	No	Can't tell	Can't tell
Azizgolshani, Porter (5)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fernandez, Cronin (18)	Yes	Yes	Can't tell	Can't tell	Can't tell	No	Can't tell	Can't tell
Bamford, Hall (7)	Yes	Yes	Yes	Yes	No	No	Yes	Yes
Baig, Sarma (6)	Yes	Yes	Yes	Yes	No	No	Yes	Yes
Chung, Hur (60)	Yes	Yes	Yes	Yes	No	No	Yes	Yes
Cushing, DeSimone (61)	Yes	Yes	Yes	Yes	No	No	Yes	Yes
Mafirakureva, Nyoni (58)	Yes	Yes	Yes	Yes	No	Can't tell	Yes	Yes

Table 9: Quality appraisal – Systematic reviews studies

Questions from CASP (systematic review checklist – section A) *(72)*	**Are the results of the review valid?**	**Did the authors look for the right type of papers?**	**Do you think all the important, relevant studies were included?**	**Did the review's authors do enough to assess quality of the included studies?**
Fadel, Patel (16)	Yes	Yes	Can't tell	No
Kleineruschkamp, Meybohm (67)	Yes	Yes	Yes	Can't tell

Table 10: Quality appraisal – Economic Evaluation studies

Questions from Drummond's checklist (73)	Was a well-defined question posed in an answerable form?	Was a comprehensive description of the competing alternatives given (i.e. who did what to whom, where, and how often)?	Was the effectiveness of the programme or services established?	Were all the important and relevant costs and consequences for each alternative identified?	Were costs and consequences measured accurately in appropriate physical units (e.g. hours of nursing time, etc)?	Were the cost and consequences valued credibly?	Were costs and consequences adjusted for differential timing?	Was an incremental analysis of costs and consequences of alternatives performed?	Was allowance made for uncertainty in the estimates of costs and consequences?	Did the presentation and discussion of study results include all issues of concern to users?
Pham, Kim (25)	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
Shafie, Wong (63)	Yes	No	No	Yes	Yes	Yes	No	No	Yes	Yes
Spillinger, Allen (31)	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
Volin, Daniel (42)	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes

Kacker, Ness (49)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Patel, Edwards (24)	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
Straub, Bauer (69)	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
Einerson, Stehlikova (15)	Yes	Yes	Yes	Yes	Can't tell	Yes	No	Yes	Yes	Yes

Table 11: Quality appraisal – Case series studies

Questions from JBI case series Checklist (74)	**1. Clear criteria for inclusion ?**	**2. Condition measured in a standard, reliable way?**	**3. Valid methods used for identification of the condition?**	**4. Consecutive inclusion of participants ?**	**5. Complete inclusion of participants ?**	**6. Clear reporting of demographics?**	**7. Clear reporting of clinical information ?**	**8. Outcomes or follow up results clearly reported ?**	**9. Clear reporting of presenting site(s)/clinic(s) demographic information?**	**10. Statistical analysis appropriate ?**
Adams, Baldwin (1)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adams, Cahill (2)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Al-Musawi, Reece (3)	Yes	Yes	Yes	Yes	Yes	Unclear	Yes	Yes	Yes	Unclear
Alyacoubi, Taj (4)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Barrett-Lee, Vatish (9)	Yes	Yes	Yes	Yes	Yes	Unclear	Yes	Yes	Yes	Unclear
Barth, Weiss (68)	Yes	Yes	Yes	Yes	Yes	Unclear	Yes	Yes	Yes	Yes
Batt, Chambers (10)	Yes	Yes	Yes	Unclear	Unclear	Unclear	Yes	Yes	Yes	Unclear
Christopher, Verhey (12)	Yes	Yes	Yes	Yes	Yes	Unclear	Yes	Yes	Yes	Yes
Compton, Szklarski (14)	Yes	Yes	Yes	Yes	Yes	N/A	Yes	Yes	Yes	Yes
Farrell, Hall (17)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Unclear
Fong, Rodriguez (20)	Yes	Yes	Yes	Yes	Yes	Unclear	Yes	Yes	Yes	Unclear
Frank, Rothschild (21)	Yes	Yes	Yes	Yes	Yes	N/A	Yes	Yes	Yes	Yes
Hainsworth, Tracy (45)	Yes	Yes	Yes	Yes	Yes	Unclear	Yes	Yes	Yes	Unclear
Haleem, Thimmaiah (71)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Hall, Pattenden (46)	Yes	Yes	Yes	Yes	Yes	N/A	Yes	Yes	Yes	Yes
Hasan, Khan (47)	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes

Hildebrand, Binnie (48)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Unclear
Mann, Sim (54)	Yes	Yes	Yes	Yes	Yes	N/A	Yes	Yes	Yes	Unclear
Mazonson, Efrusy (57)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Parker, Mahawar (23)	Yes	Yes	Yes	Yes	Yes	N/A	Yes	Yes	Yes	Unclear
Rayborn, Turner (26)	Unclear	Yes	Yes	Unclear	Unclear	Yes	Yes	Yes	Yes	Unclear
Rinehart, Lee (28)	Yes	Yes	Yes	Yes	Yes	N/A	Yes	Yes	Yes	Yes

Figure 1: Subgroup analysis of GS test, by country and valuation type

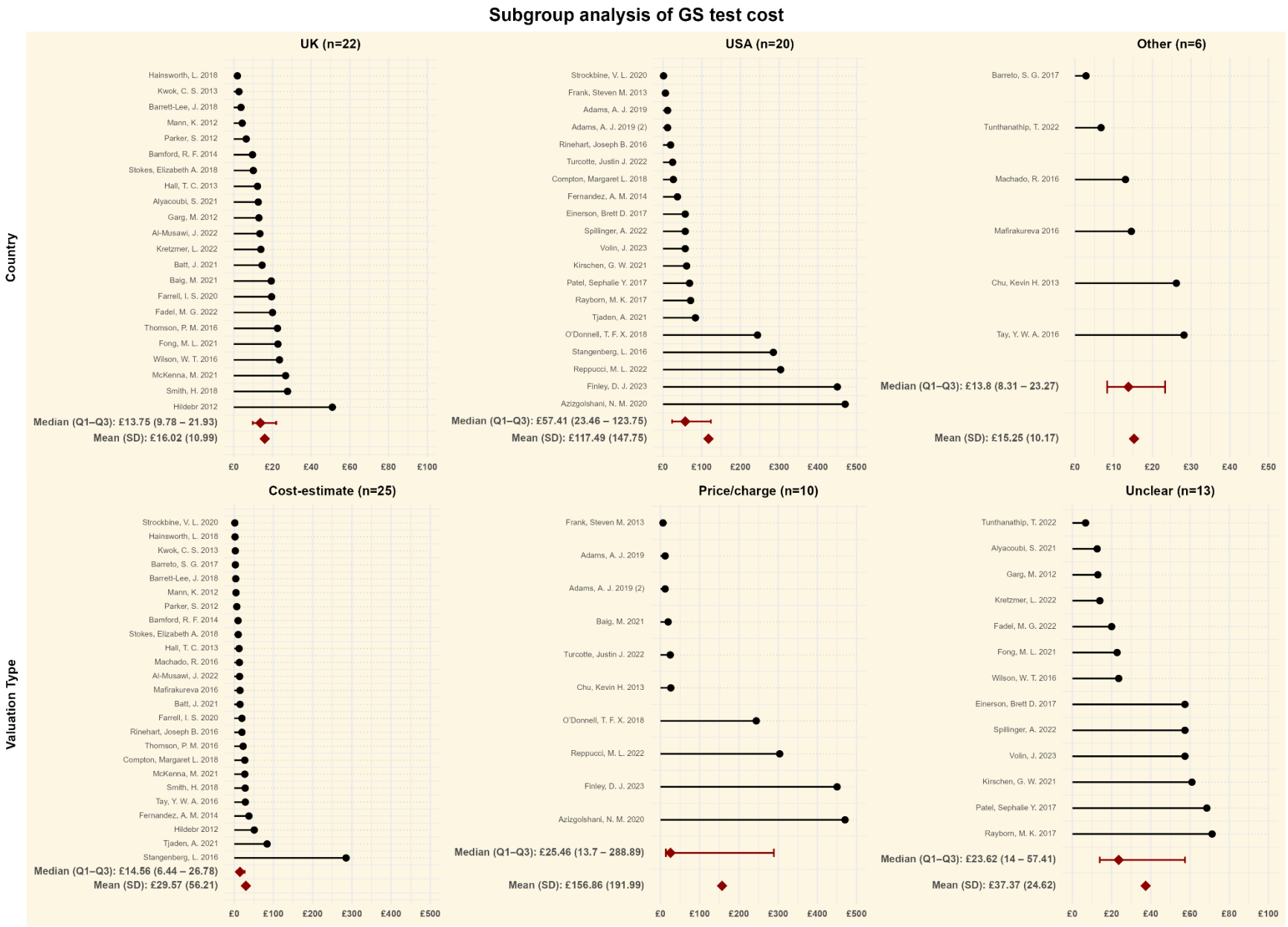
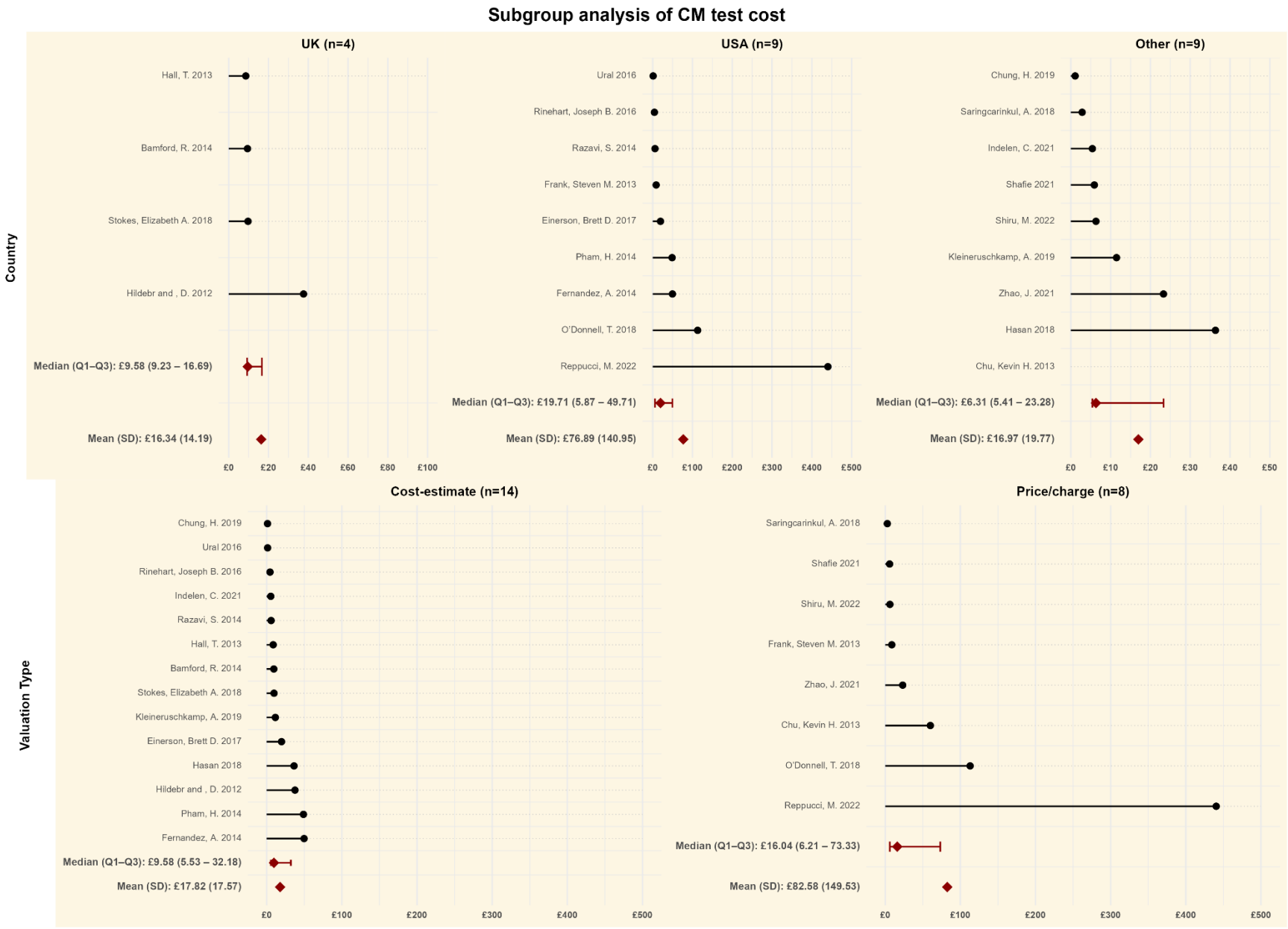


Figure 2: Subgroup analysis of CM test, by country and valuation type



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