

Characterisation of blood eosinophils and their association with disease outcomes in steroid-naïve COPD patients in primary care: Descriptive cohort study using the Clinical Practice Research Datalink

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Aim

Blood eosinophils are a potentially useful biomarker to guide choice of maintenance treatment in COPD. We aimed to investigate rates of blood eosinophil testing, blood eosinophil counts, and their relationship to patient characteristics and disease outcomes in routine primary care.

Approach

- New user cohort study of patients newly prescribed an inhaled maintenance medication (ICS or non-ICS) using the Clinical Practice Research Datalink (CPRD) which collects routine data from UK primary care, linked with Hospital Episode Statistics (HES)
- We explored the relationship between the most recent blood eosinophil count in the two years before index date, divided into high ($\geq 150/\mu\text{L}$) and low ($< 150/\mu\text{L}$) groups, with patient and disease characteristics
- Cox regression compared eosinophil groups for time-to-first exacerbation after maintenance treatment initiation

Included participants

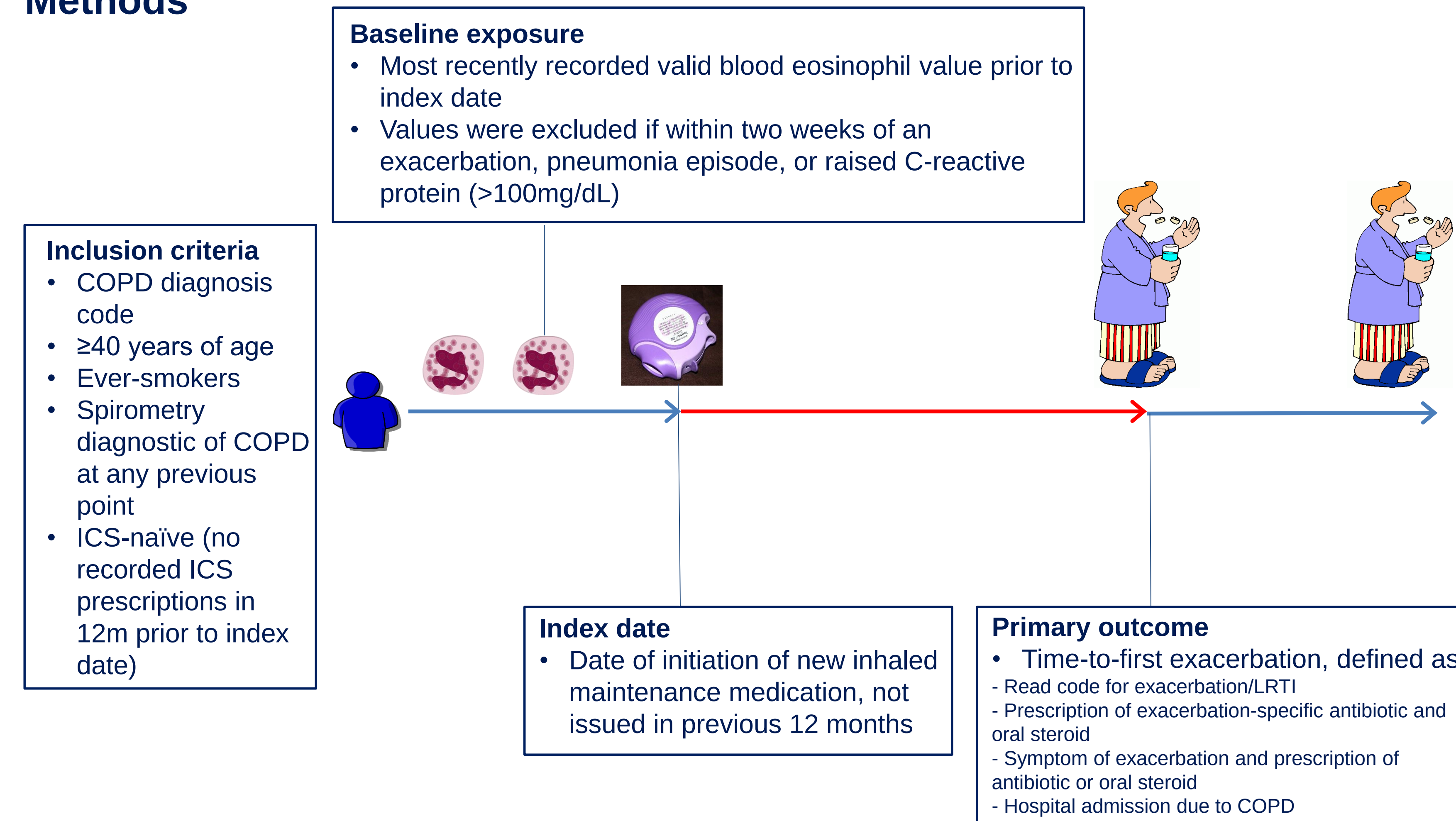
CPRD August 2016 release acceptable patients	14,480,384
↓ COPD diagnosis	325,279
↓ COPD maintenance medication	
↓ No other diagnosis of respiratory disease	238,242
↓ Qualifying ICS or non-ICS prescription (ICS-naïve, 1 st Jan 2005 or later)	89,512
↓ Current or ex-smoker	84,644
↓ Eligible spirometry	61,001
↓ Not ≥ 3 oral steroid prescriptions in year before index date	57,513
↓ Not commencing triple therapy	54,279
↓ Data linkage available	32,253
↓ At least 6 months follow-up	30,378 included patients

Results: Who has higher eosinophils?

Co-variables significantly associated with higher eosinophils:

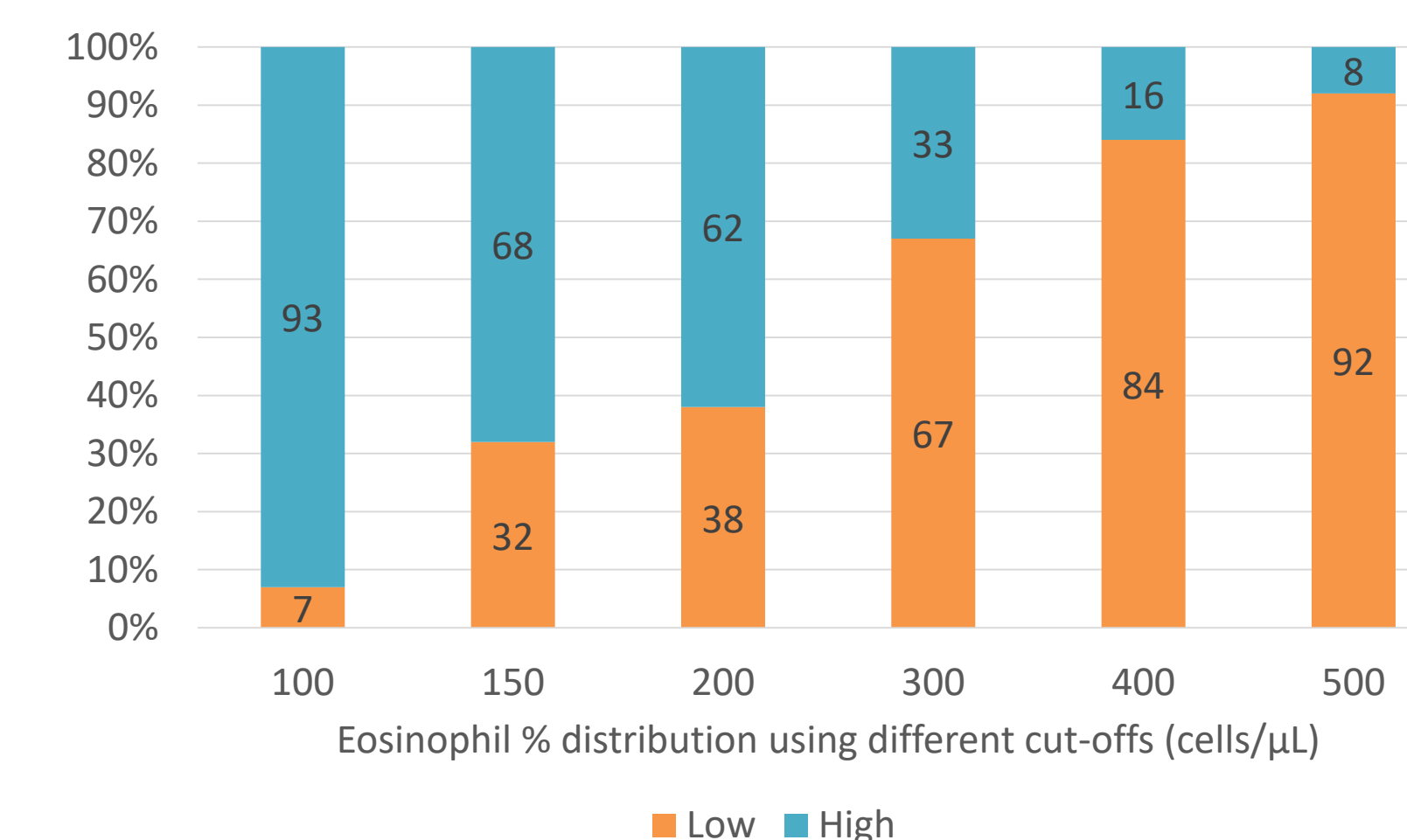
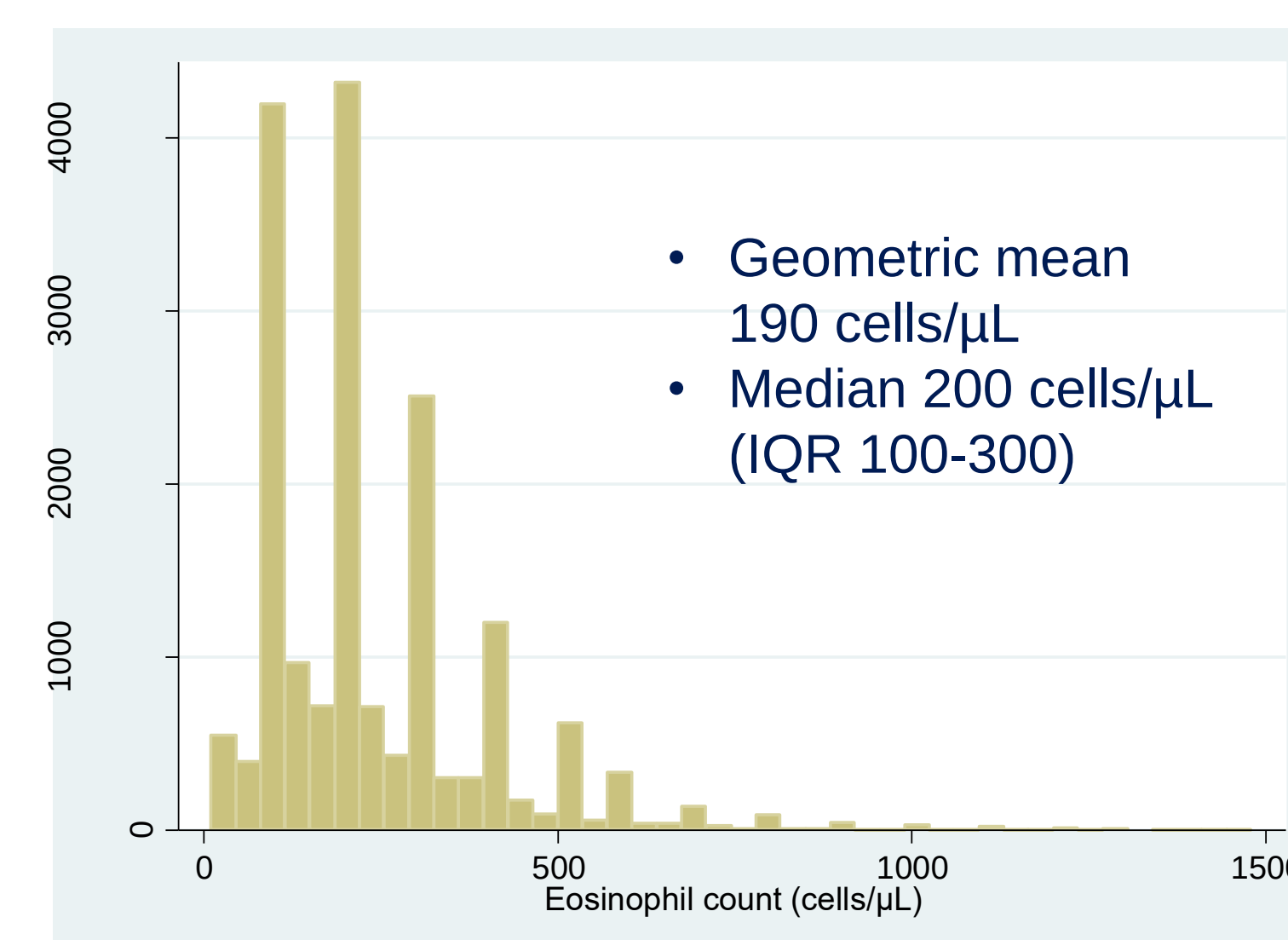
- younger age
- male sex
- ex-smokers
- history of atopy
- higher FEV₁
- more frequent exacerbators
- more oral steroid courses
- increased co-morbidity
- NOT asthma except in secondary continuous eosinophil analysis

Methods



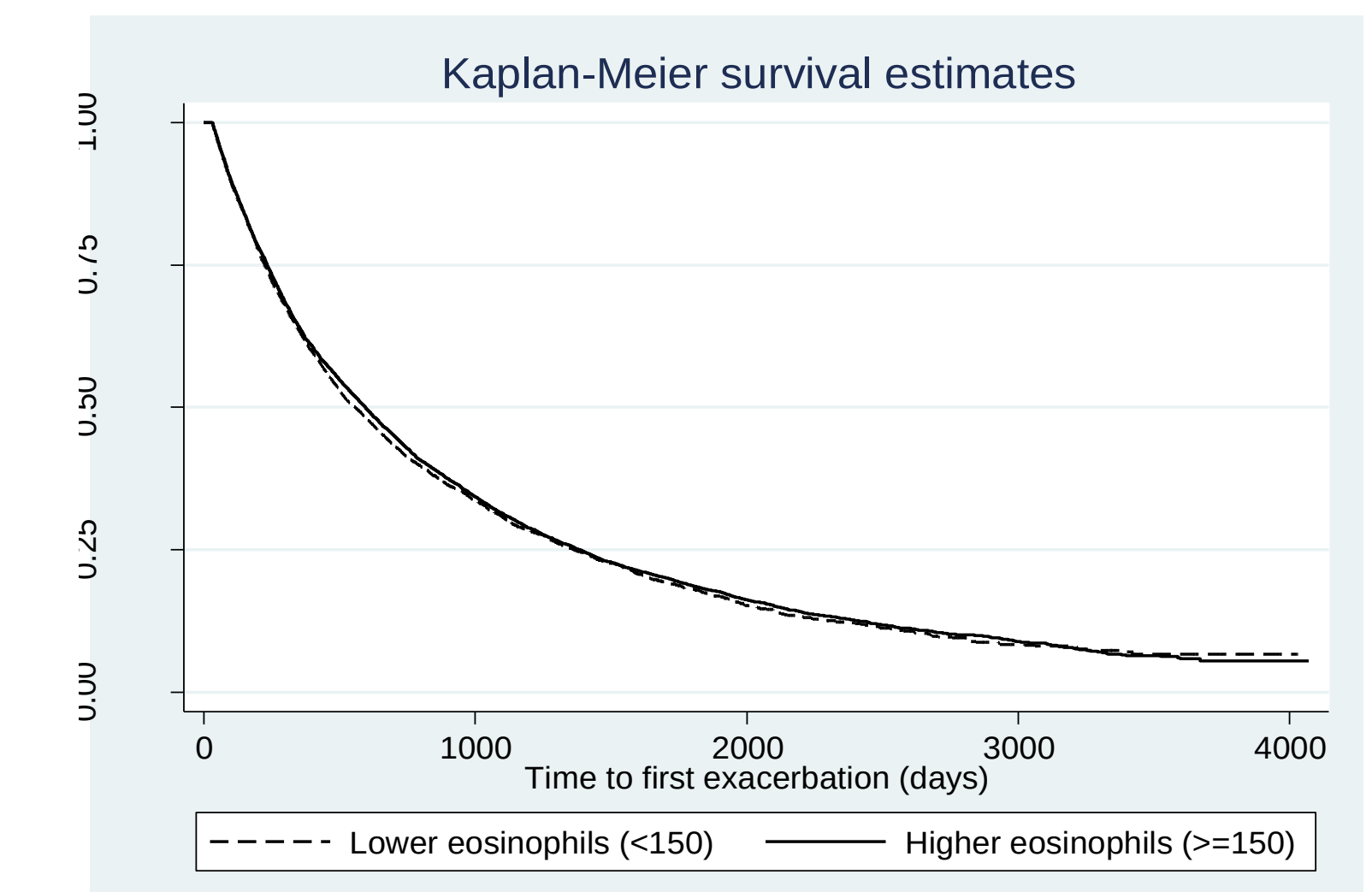
Results: Eosinophil testing

- 18,457 (60.8%) had a valid eosinophil count
- High (≥ 150) most recent count vs. two year mean positive predictive value 98.4% (95%CI 98.1-98.6%)



- Median 2 tests per person in year before index (IQR 1-3, range 1-42), median 183 days prior to index date
- Eosinophil testing occurred less in males, current smokers, those with asthma, those with more severe COPD and with more frequent exacerbations

Results: Eosinophils as prognostic marker?



Adjusted hazard ratio (n=17,402): 0.97 (0.93-1.00) p=0.067

No significance at alternative eosinophil thresholds
Continuous (log): small association of higher eosinophils with better outcome – adjusted HR 0.97 (0.95-1.00), p=0.033

Summary of main findings

- Eosinophil group is not a significant marker of prognosis (at any threshold)
- Higher eosinophils are associated with various person- and disease-related characteristics
- A high most recent eosinophil count at time of maintenance treatment initiation predicts mean eosinophil count over the previous two years, suggesting it may be a suitable surrogate for multiple values over time

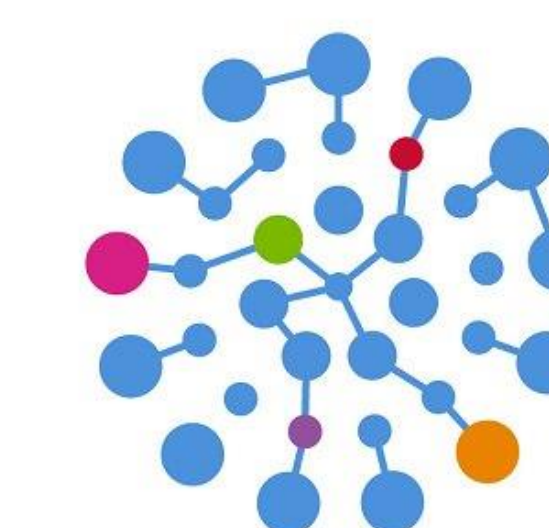
Limitations

- Blood eosinophil counts are those collected as part of routine clinical practice, which may not truly reflect stable or baseline state. Patients with valid blood eosinophil counts in this study had different baseline characteristics to ineligible patients, so findings may not be applicable to the whole COPD population
- Nonetheless these findings corroborate recently published prospective and database study findings
- A prospective study to establish blood eosinophil values in the primary care COPD population has completed recruitment

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CPRD