EPH27

Beyond the Guidelines: Exploring the Characteristics and Comorbidity Profiles of Adults with Pneumococcal Disease in England Not Covered by Current Pneumococcal Vaccination Criteria

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Introduction

- In England, adult pneumococcal vaccines are currently recommended by the (JCVI) Joint Committee on Vaccination and Immunisation for:
  - Adults **≥65 years**
  - Adults **18-64 years with established risk conditions**[1]
- **Evidence gap:** Some adults who develop pneumococcal disease (PD) do not fall within these criteria, potentially representing a missed opportunity for disease prevention. Evidence is limited on the characteristics of these individuals (such as comorbidities, socioeconomic factors, or healthcare access) that may increase vulnerability outside currently defined risk groups
- **Relevance:** Leveraging real-world data to characterize a large population of adults with pneumococcal disease may begin to uncover patterns and potential gaps in current recommendations. These insights could guide future efforts towards:
  - **Reducing the disease burden:** Targeting prevention strategies where they are most needed
  - **Enhancing vaccine policy understanding:** Adding context to inform how recommendations could adapt over time to cover populations most vulnerable for PD
- **Exploratory aim:** This exploratory aim examined comorbidity profiles of adults diagnosed with pneumococcal disease **not currently eligible** for pneumococcal vaccines under JCVI guidelines
  - The overall study objective was to assess pneumococcal vaccination coverage and the clinical and economic burden among UK adults

Methods

Study design and data sources

- Retrospective study using linked electronic healthcare records (EHRs) from Clinical Practice Research Datalink (CPRD) Aurum and Hospital Episodes Statistics (HES)
  - Includes primary care, inpatient, outpatient and A&E records
- Study period: 2017 to 2023

Study population and follow-up

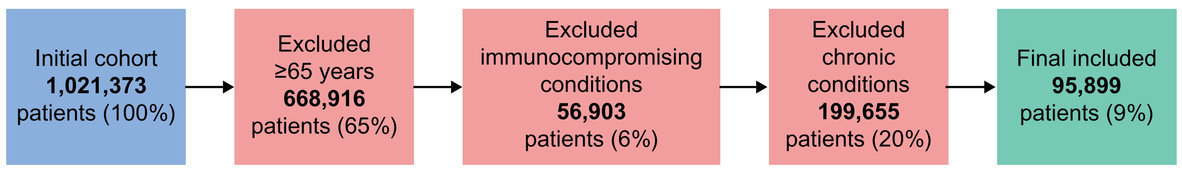
- Adults ≥18 years in England
- Diagnosed between 1 January 2017 and 30 April 2023 with ≥1 episode of pneumococcal disease:
  - Invasive pneumococcal disease (IPD)
  - Non-bacteremic pneumococcal pneumonia (NBPP)
  - All-cause pneumonia (ACP)
- Exclusions: Individuals ≥65 years, and those with chronic or immunocompromising conditions per current JCVI recommendations
- Follow-up: 12 months prior to first recorded episode to assess comorbidities

Study measures and analysis

- Unit of analysis: patient with ≥1 disease episode
- Episode identification: ICD-10 codes in secondary care data and Medcodes in primary care data across all diagnosis fields
- Comorbidity assessment: Identified in the 12-month period prior to their first PD diagnosis. Each comorbidity was counted individually; therefore patients could contribute to multiple comorbidity categories if more than one was present
- Descriptive statistics to identify most frequently occurring comorbidities aggregated across health care settings
- Results were stratified by age group (18-49, 50-64) and sex (male, female)

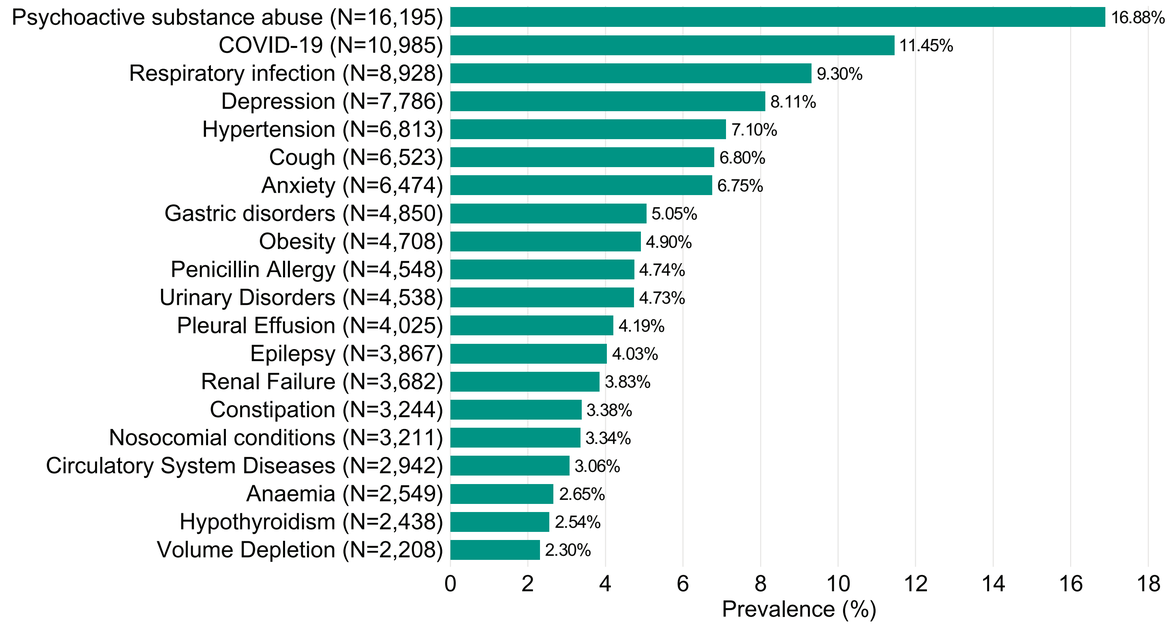
Results

Figure 1. Study flow chart



The study identified 1,021,373 PD patients between January 2017 to April 2023. After excluding 65% (n=668,916) aged ≥65 years, 6% (n=56,903) with immunocompromising conditions known to increase PD risk, and 20% (n=199,655) with chronic conditions known to increase PD risk, 9% (n=95,899) of the initial cohort were included in the analysis. Among those included, 51% were male, 62% were aged 18-49 years and 53.5% had ≥1 comorbidity among the top 20 most frequently occurring conditions (**Figure 2**)

Figure 2. Top 20 most frequently occurring comorbidities



Patients may appear in multiple categories if more than one comorbidity was present during the 12-month look-back period.

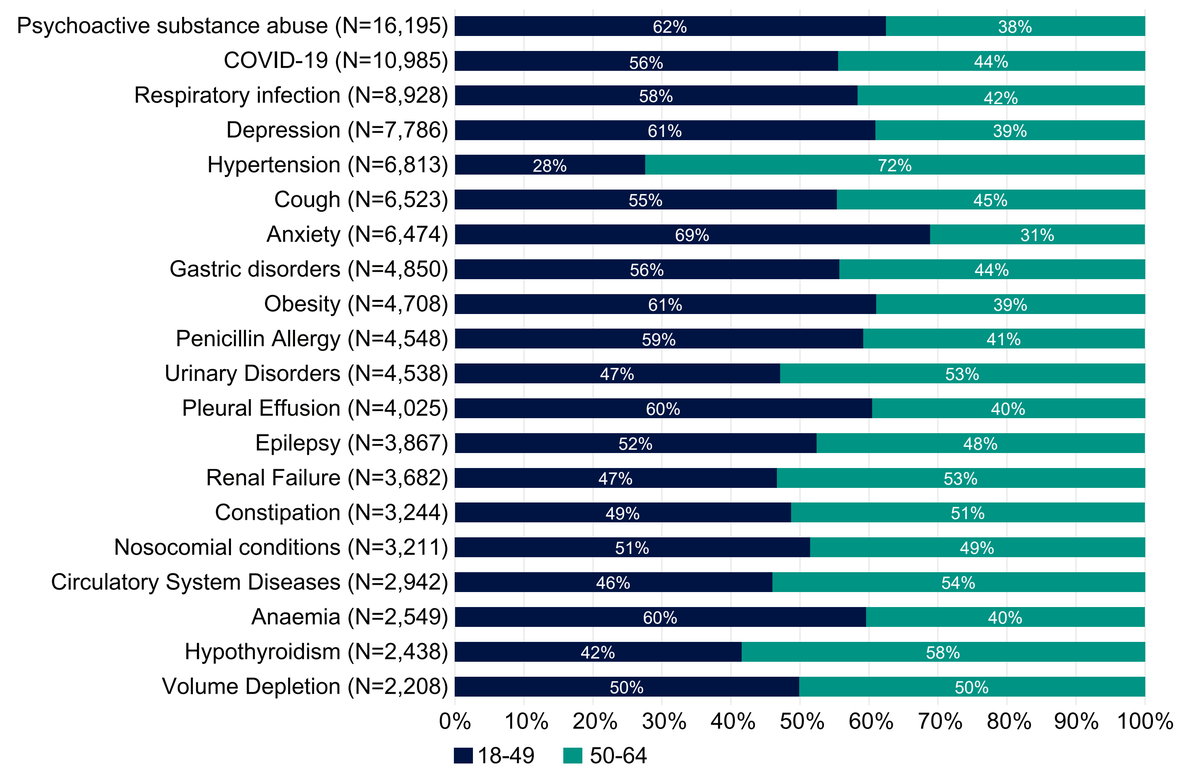
Among the top 20 most frequently occurring conditions, mental health disorders were common, including psychoactive substance abuse (17%), depression (8%), and anxiety (7%). Respiratory conditions were frequent: 12% COVID-19, 9% respiratory tract infections, 7% cough, and 4% pleural effusion. Hypertension was present in 7%, gastrointestinal disorders in 8%, and obesity in 5%

*Percentages are not additive since individuals could have multiple conditions.

Age and sex patterns

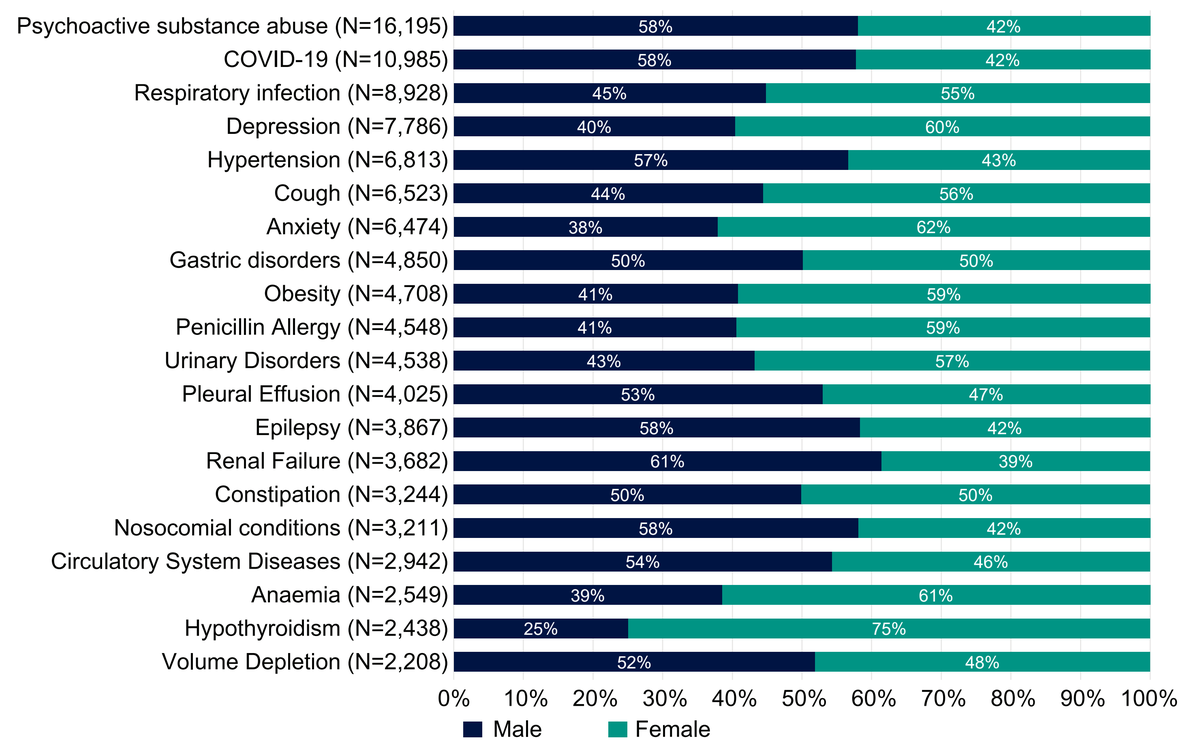
Hypertension showed a clear older-age trend, with nearly 75% of cases occurring in adults aged 50-64 years. In contrast, anxiety and obesity were predominantly observed in younger adults, with more than 60% of cases in the 18–49 age group (**Figure 3**). Sex differences were also evident: hypothyroidism and anaemia were more common in females (75% and 62% respectively), while renal failure and psychoactive substance abuse were more common among males (62% and 58% respectively)

Figure 3. Most frequently occurring comorbidities by age (years)



Patients may appear in multiple categories if more than one comorbidity was present during the 12-month look-back period.

Figure 4. Most frequently occurring comorbidities by sex



Patients may appear in multiple categories if more than one comorbidity was present during the 12-month look-back period.

Discussion

This exploratory analysis identified nearly 96,000 English adults with pneumococcal disease (PD) from 2016 to 2023, who were not eligible for pneumococcal vaccination under current JCVI guidelines

Key findings:

- **Mental health and respiratory conditions were most common:** Including psychoactive substance abuse, depression, anxiety, COVID-19, and respiratory infections
- **Additional frequently occurring comorbidities:** Hypertension, gastrointestinal disorders, endocrine disorders, and obesity
- **Notable age distributions:** Cardiometabolic conditions clustered in older adults, while mental health and obesity were more common in younger groups
- **Notable sex distributions:** Endocrine and hematologic conditions were more frequent in women and renal and substance-related conditions in men

The observed comorbidity patterns may reflect **behavioral, social, and clinical factors** that increase susceptibility to PD, highlighting the need for further research

Limitations

- **Broad definition of pneumococcal disease:** PD was defined to include IPD, NBPP, and ACP. This broader classification was intended to capture the incremental burden that may be missed due to the under-ascertainment of pneumococcal pneumonia in electronic health records
- **Multimorbidity unaccounted for:** The frequency of individual comorbidities was estimated independently, without accounting for the cumulative impact of multiple co-occurring towards PD risk
- **Data limitations:** Lack of information regarding the severity, duration, and treatment status of comorbid conditions

Conclusions

- This study identified additional conditions that are not currently included in JCVI pneumococcal vaccination guidelines suggesting that **vulnerability to PD may extend beyond traditional risk groups**
- This study provides an initial exploratory step, but more comprehensive research is required to address the current limitations to confirm associations and explore the cost-effectiveness of broader prevention strategies

References

1. UK Health Security Agency. (2025). Pneumococcal: the Green Book, Chapter 25. https://www.gov.uk/government/publications/pneumococcal-the-green-book-chapter-25

Glossary

JCVI: Joint Committee on Vaccination and Immunisation; **PD:** Pneumococcal Disease; **EHRs:** Electronic Healthcare Records; **CPRD:** Clinical Practice Research Datalink; **HES:** Hospital Episodes Statistics

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Presented at Meeting: ISPOR-EU, Glasgow, Scotland, United Kingdom, November 9-12, 2025.