Budget impact of implementing a case-finding programme in UK patients at high-risk for COPD to explore cost savings due to earlier diagnosis

[EE106]

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Background

Chronic Obstructive Pulmonary Disease (COPD) is a collective term for a group of lung conditions that cause breathing difficulties (1). COPD is a progressive, irreversible disease, but with the correct treatment, symptoms can be managed (1). The annual economic impact of COPD in the UK is estimated to be £1.9 billion (2). This cost reflects medicines, monitoring costs (including outpatient clinics and GP appointments) as well as flare-ups of symptoms, known as exacerbations, which can result in hospitalisation. Studies have shown that a **late diagnosis of COPD** can result in **delayed access** to medication and a resulting increased risk of exacerbation (3).

FRONTIER is a collaborative working project between Hull University Teaching Hospitals NHS Trust and Chiesi Ltd. The project aims to identify individuals at high-risk of COPD following lung cancer screening, offer diagnostic assessment via a one-stop clinic, and facilitate early access to evidence-based pharmacological and non-pharmacological treatments to improve clinical outcomes (4).

Objective

This study aimed to develop a **budget impact model (BIM)** and estimate the potential budget impact of introducing a COPD case-finding programme to identify undiagnosed COPD patients from a high-risk population, attending lung cancer screening, enabling earlier diagnosis and access to treatment (5). The perspective of the National Health Service (NHS) was adopted for this analysis as the reference case. The model considered a 10-year period after the introduction of a COPD case-finding programme.

Methods

The target population considered for the BIM was patients diagnosed with COPD in England. The current COPD population was modelled as the baseline scenario (the world without COPD case-finding). The touchpoints with the healthcare system were quantified in the context of a typical patient pathway, and a resulting cost was calculated. Whilst the population in the world without COPD case-finding could instead comprise undiagnosed COPD patients, this population has not been well characterised in the literature so the true healthcare resource utilisation (HCRU) and corresponding cost cannot accurately be determined. Instead, HCRU values from the current COPD population were used based on the assumption that these patients comprise a COPD population diagnosed later than the screened patients, specifically at year 4 after entering the model. This baseline population is well characterised and the HCRU is widely published so accurate costs were determined.

The model has been designed so that all HCRU values for both the world without and with case-finding are user-modifiable, therefore they can be adjusted to allow comparison to a different population should new data become available.

The world with COPD case-finding was modelled as a **projected scenario** comprising patients who have undergone COPD case-finding and have received an early diagnosis. It was assumed that these patients will initiate treatment earlier, thus reducing their risk of future exacerbations.

The cost of the patient pathway in the projected scenario was offset against the costs incurred by a COPD case-finding approach. This will support the business case for further roll out of COPD case-finding within the NHS.

The BIM was developed in Microsoft (MS) Excel 365, incorporating visual basic application (VBA) programming where valuable. The model included worksheets (or model screens) to include model overview, executive summary, population, market share, cost inputs, results (e.g., graphs and tables), references, and model notes. All parameters are **fully customisable** so that payer-specific scenarios can be developed for relevant stakeholders.

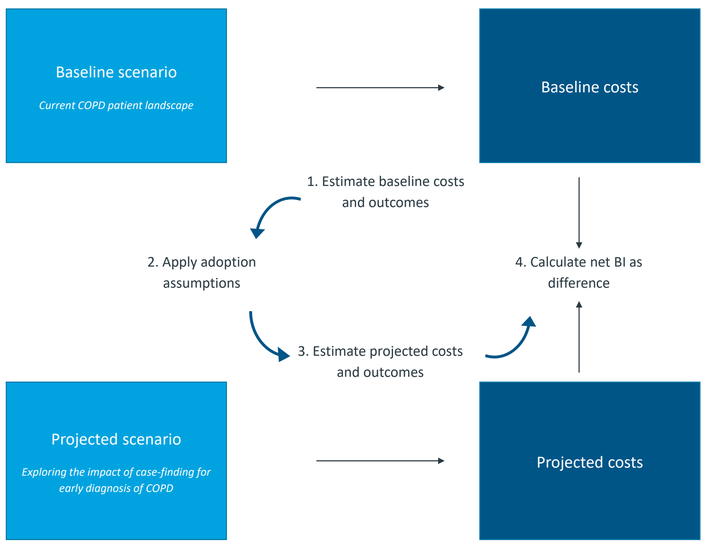

Figure 1: BIM model schematic

The perspective of the **National Health Service (NHS) and Personal and Social Services (PSS**) in England was adopted for this analysis. Direct healthcare costs consisted of drug costs and disease management costs.

The budget impact was presented over 10 years as default. The model has flexibility to vary the time horizon between 1 and 10 years.

Resource category	COPD case-finding	Monitoring	Exacerbations
Resource list	• Band 7 nurse • Spirometry and bronchodilator response test	• Spirometry • CAT • CT Scan • GP appointments • Regular COPD review • Outpatient appointments	• A&E visit without admission • Respiratory team visit • GP appointment • Oral corticosteroids • Antibiotics • Ambulance Journey to A&E • Hospital Stay • Ventilator

Table 1: Various Resource categories and parameters included in the BIM

Results

Base-case settings:

This model is driven by the number of high-risk patients in the COPD case-finding programme and this value can be **inputted by the user.** Therefore, total calculated budget impact will be proportionate to the number of patients who undergo case-finding as defined by the needs of the user.

Base-case results are presented using the population inputs outlined in Table 2, alongside a set of example user-defined inputs based on the **FRONTIER** project. In practice, users may wish to explore the impact of screening different numbers of patients and other preferred inputs, which will affect the model outcomes. A starting year of 2025 was selected for the analysis.

	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
At risk population screened	800	800	800	800	800	800	800	800	800	800

Table 2: Input values for the population of patients undergoing COPD case-finding for base-case analysis

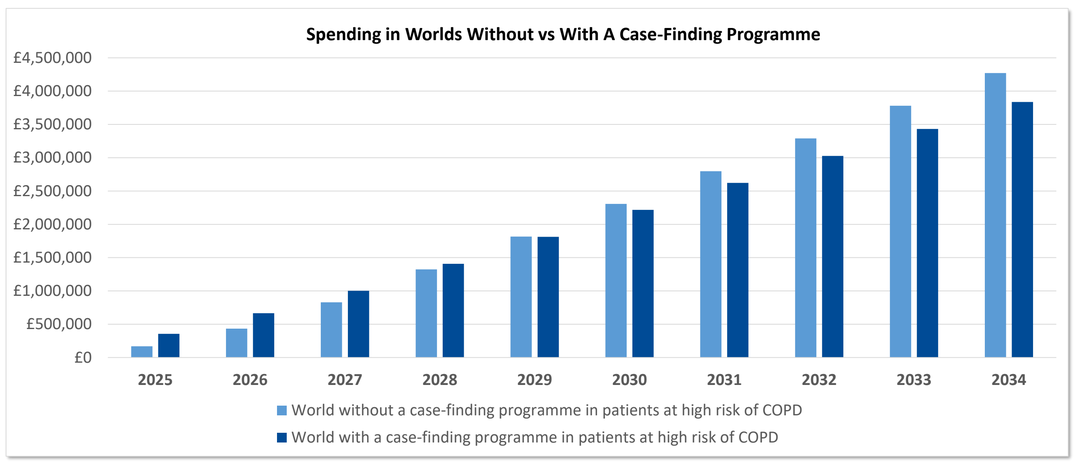

Figure 2: Base-case analysis - Spending in the world with and without COPD case-finding over the time horizon

Base-case scenario inputs were defined according to medical expert opinion. The introduction of a COPD case-finding programme results in a decreased budget of **£636,625 across the 10-year period.** This represents a budget reduction of **9.6%**. Notably, while the world with the case-finding programme was initially more costly, due to the costs associated with starting the treatment earlier than in the world without the case-finding programme (Figure 2), the case-finding becomes **cost saving** in later years, as the early diagnosis allows for the **reduction of long-term exacerbations** and improvement of outcomes through **earlier appropriate treatment** (Figure 3).

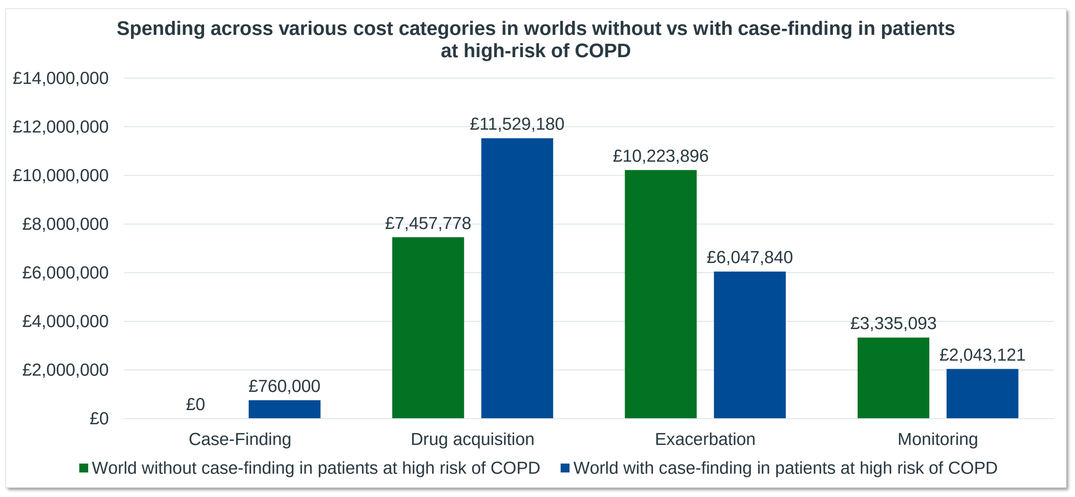

Figure 3: Base-case analysis - Spending across cost categories in the world with and without COPD case-finding

Discussion and needs for future research

- The introduction of a case-finding programme for COPD is expected to **reduce exacerbation** and monitoring costs leading to **budget savings** over a long-term horizon.
- Deterministic results for the base-case indicate that the model is sensitive to a +/-20% change the **cost of therapies** administered to COPD patients, as well as the **rates of exacerbation**, particularly in the later years after entering the mode
- The model has been built with the best available data and assumptions; however, there are still limitations concerning data availability to be acknowledged. Most of these limitations are related to evidence gaps for the HCRU for the patients who receive an early COPD diagnosis through the case-finding programme. As more data becomes available through the **FRONTIER** project, more accurate values can be inputted into the model.

Conclusion

- The model assessed the budget impact of implementing a COPD case-finding program in England over 10 years for 800 high-risk patients annually, resulting in a **£636,625 total budget reduction**.
- Results from the model indicate **long-term cost savings** derived from implementation of a COPD case finding problem due to lower exacerbation rates and fewer monitoring costs.
- The initially higher budget impact in years 1-4 is **compensated by long-term cost savings.**
- The adaptability of the model allows for budget impact to be assessed at a **national and local level.**

References

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Abbreviations

COPD: Chronic Obstructive Pulmonary Disease; BIM: Budget Impact Model, HCRU: Health Care Resource Utilisation; CAT: COPD Assessment Test, CT: Computed Tomography, A&E: Accident & Emergency, GP: General Practitioner, NHS: National Health Service.

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