

Projecting the Potential Impact of Disease Modifying Therapy on Future Health and Social Care Costs of Alzheimer’s Disease

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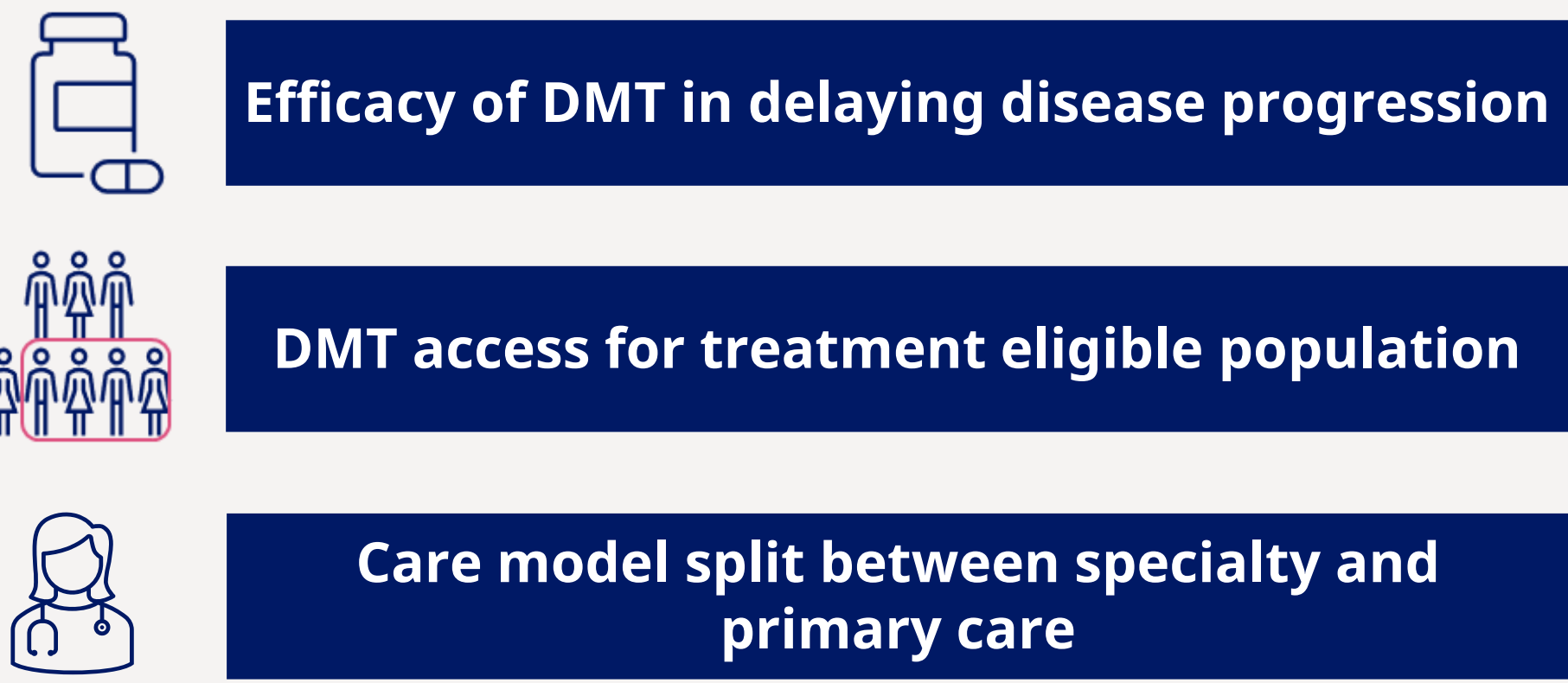
Aims

- To develop a projection model to estimate the future prevalence of Alzheimer’s Disease (AD) overall and stratified by disease severity in the United Kingdom (UK) from 2020-2040.
- To model a range of what-if scenarios to explore and estimate future potential impacts of a disease modifying therapy (DMT) for AD on health and social care costs in the UK.

Introduction

- In the UK, approximately 900,000 individuals (aged 65 years or over) are currently living with dementia and with an ageing population, this is only projected to increase¹.
- The cost of dementia to the UK is currently £34.7 billion a year, which equates to approximately £32,250 per person per year, and two thirds of this cost is being paid by people with dementia and their families².
- AD is the most common type of dementia accounting for 60-70% of all dementia cases³.
- There is currently a very low uptake of emerging DMTs for AD and there is a large evidence gap in the potential impact of DMTs on the future burden of AD.

Three what-if scenarios considered different values for key parameters



Methods

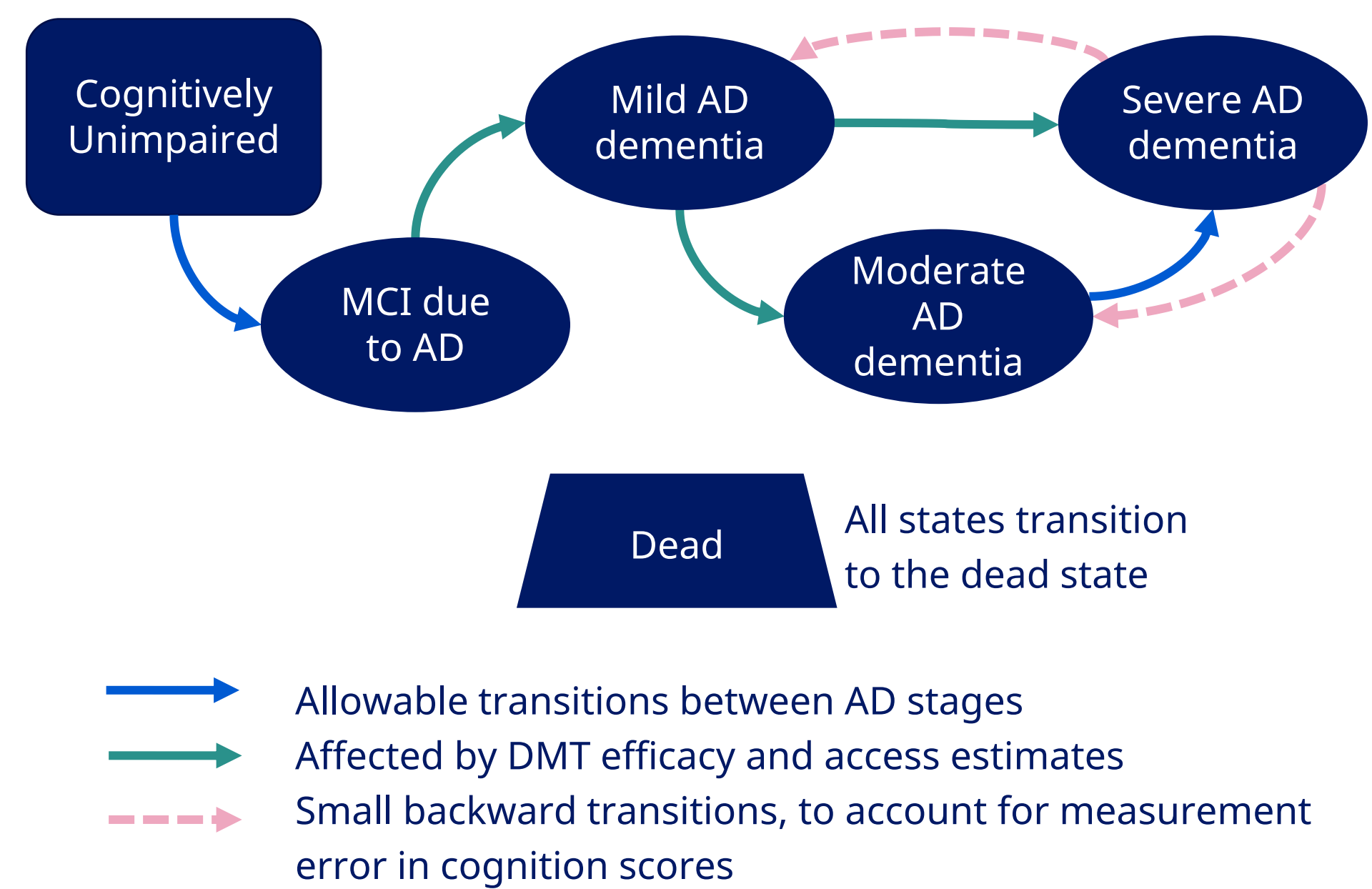
Model design:

- A cohort Markov model was developed to predict the distribution of the UK population across cognitively unimpaired and 4 stages of AD (Mild Cognitive Impairment (MCI) due to AD, and mild, moderate, severe AD dementia) for 2020–2040.

Data sources:

- This model utilised national UK population projections and literature on AD prevalence⁴ and transition rates between AD-related stages⁵ to model the number of people living with AD by severity in the UK.
- Published health and social care cost data for each AD stage^{6,7} and for primary and specialist care treatments in the UK⁸, supplemented by cost data from AD dementia patients in Northwest London (the Discover cohort), was applied to estimate direct health and social care costs of the population.

Figure 1: State structure for the cohort Markov model with allowable transitions between states

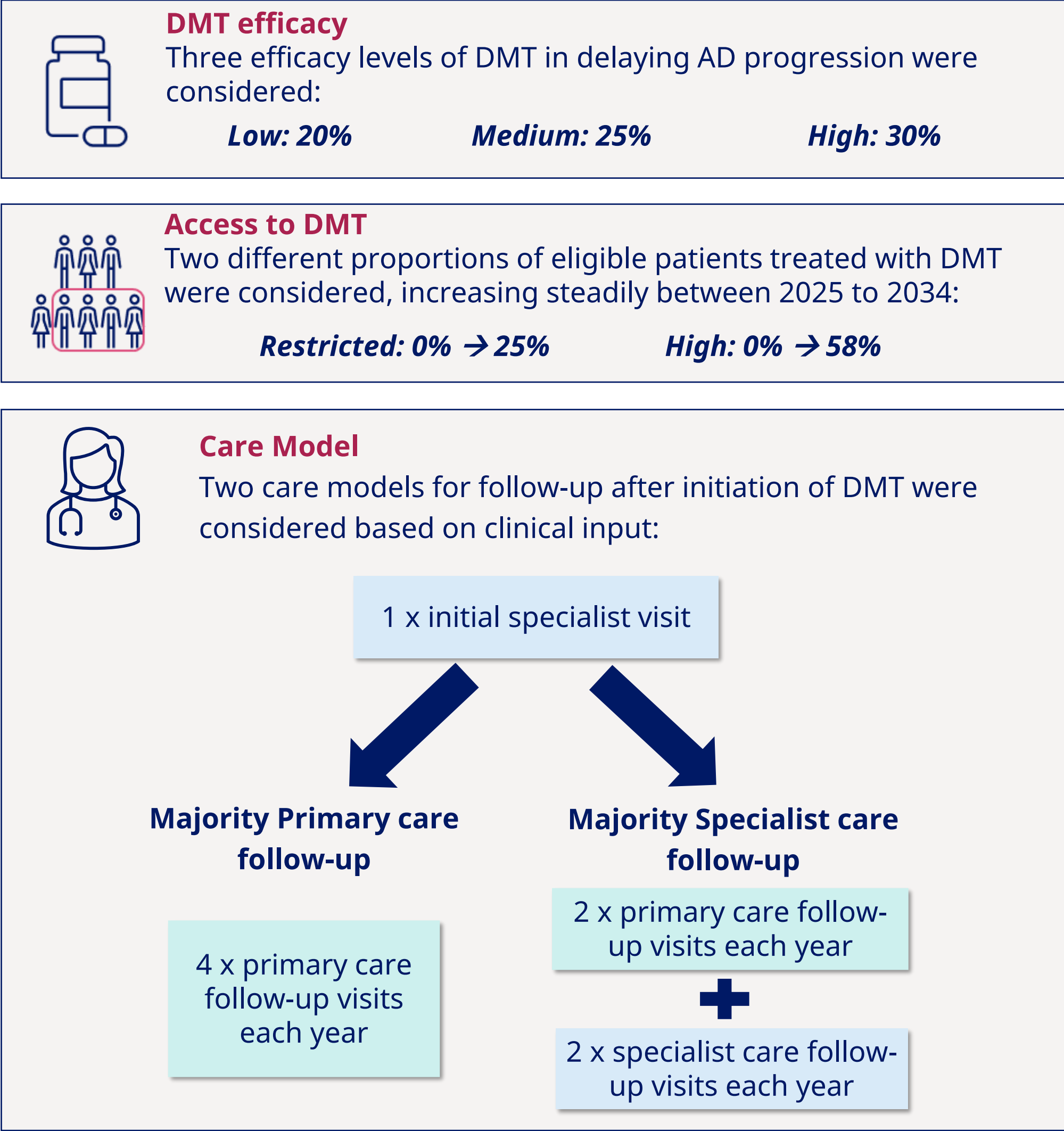


General Model Assumptions:

- DMT for people who have either MCI due to AD or mild AD dementia is expected to be approved in the UK in 2025.
- Using a DMT is assumed to delay disease progression from MCI due to AD and mild AD dementia stages to the more severe AD stages and this effect is modelled by a reduced transition rate for these stages.
- The DMT has no effect on the transition rate from moderate AD dementia to severe AD dementia, however, it is still modelled as the cost differences from using a DMT arise from having fewer people in these more severe, higher cost AD stages.
- Only potential changes in healthcare practice due to DMT and DMT treatment for AD are considered in this model.
- The cost of the DMT itself is not known at present and hence not included in the analysis.
- All projected costs and cost savings are reported in 2019 monetary values.
- A complete list of assumptions used in the model can be made available on request.

Scenarios

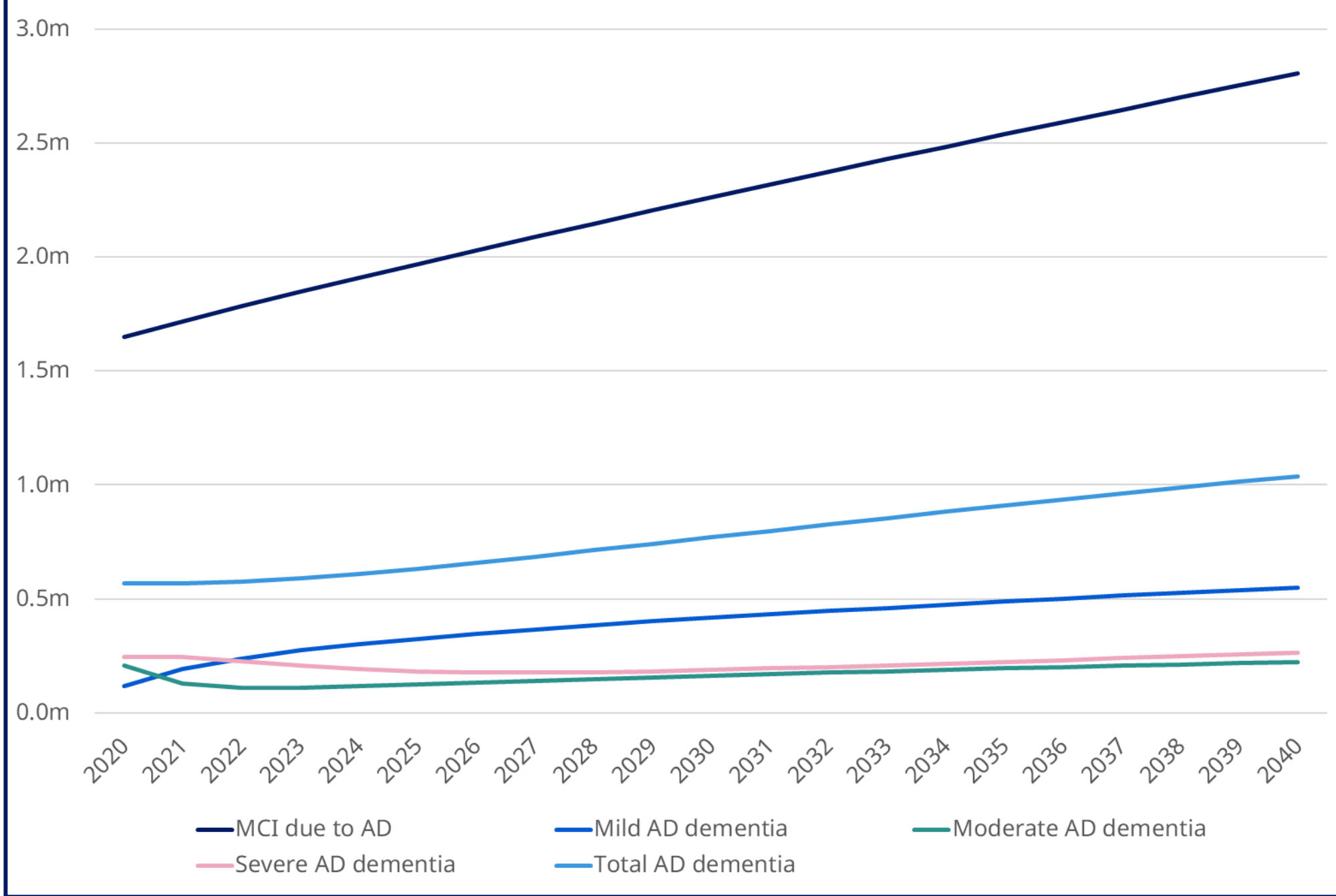
- A baseline scenario of no access to DMT was projected.
- What-if scenarios for DMT access combining a range of potential DMT efficacies, access levels and future care models, were then modelled, with parameters based on input from four clinical/scientific AD experts:



Results

- In the absence of DMT access (the baseline scenario), around 1 million people (1.5% prevalence) were projected to have AD dementia in the UK by 2040, compared to 570,000 people (0.9% prevalence) in 2020, an 82% increase.
- Additionally, 2.8 million (4%) people were projected to have MCI due to AD, in the UK by 2040, compared to 1.6 million (2%) in 2020, a 70% increase.

Figure 2: Projected population of MCI due to AD and AD dementia in the UK from 2020-2040.



- Under the various DMT scenarios with majority primary care follow-up, cumulative health and social care cost savings of £4.4–12.9bn over 2020–2040 were estimated.
- These savings were based on projected reductions of 34k–98k people with AD dementia and increases of 59k–166k people with MCI due to AD by 2040.
- In medium-efficacy scenarios, moving from restricted-access to high-access doubled cumulative cost savings (from £4.4bn to £10.1bn by 2040), demonstrating a potential high-cost impact of improved access to DMT.
- The care model makes a major difference to future costs, with significantly smaller projected savings in the majority specialist care scenarios.

Figure 3: Cumulative health and social care savings by 2040 versus no DMT baseline

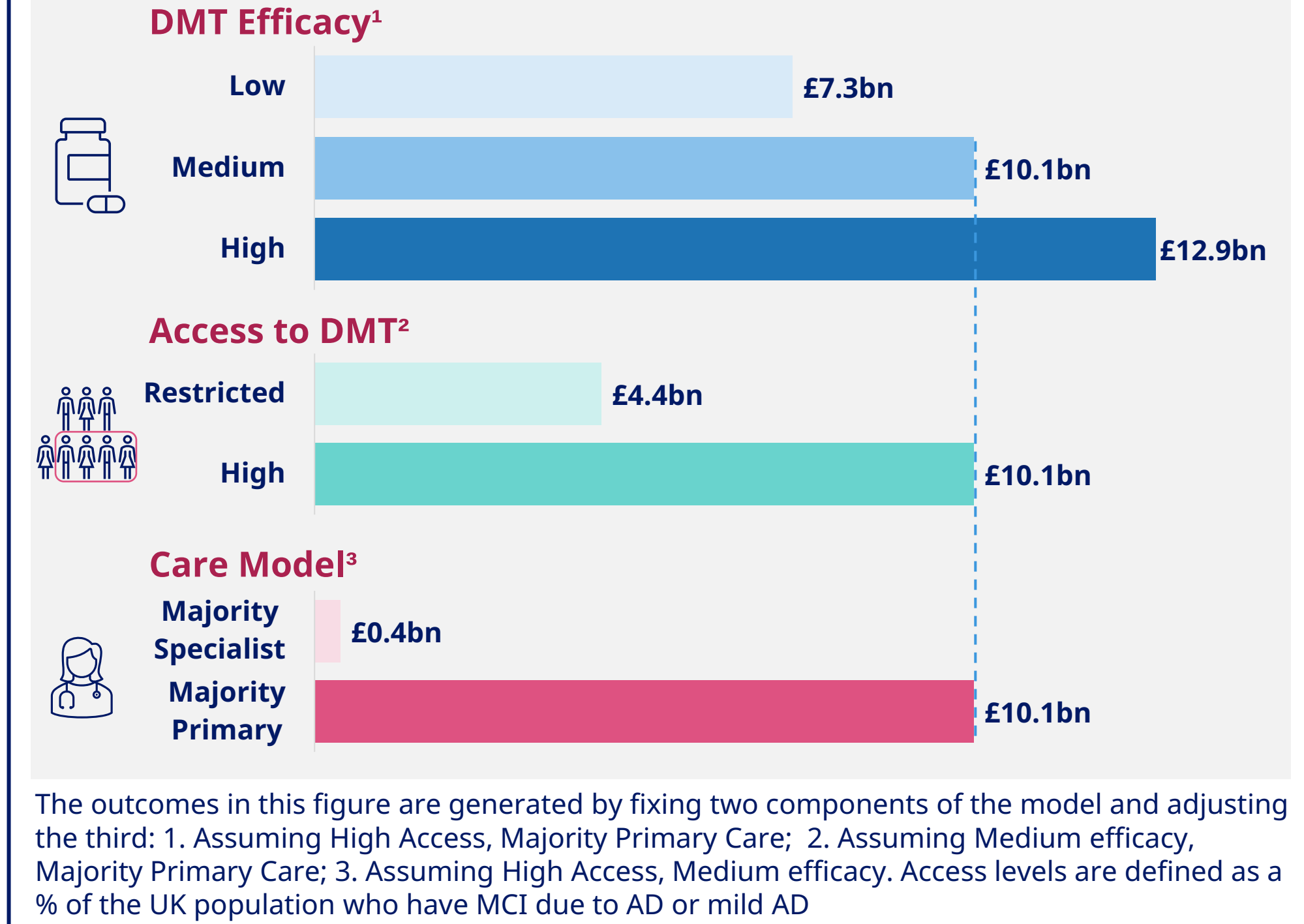
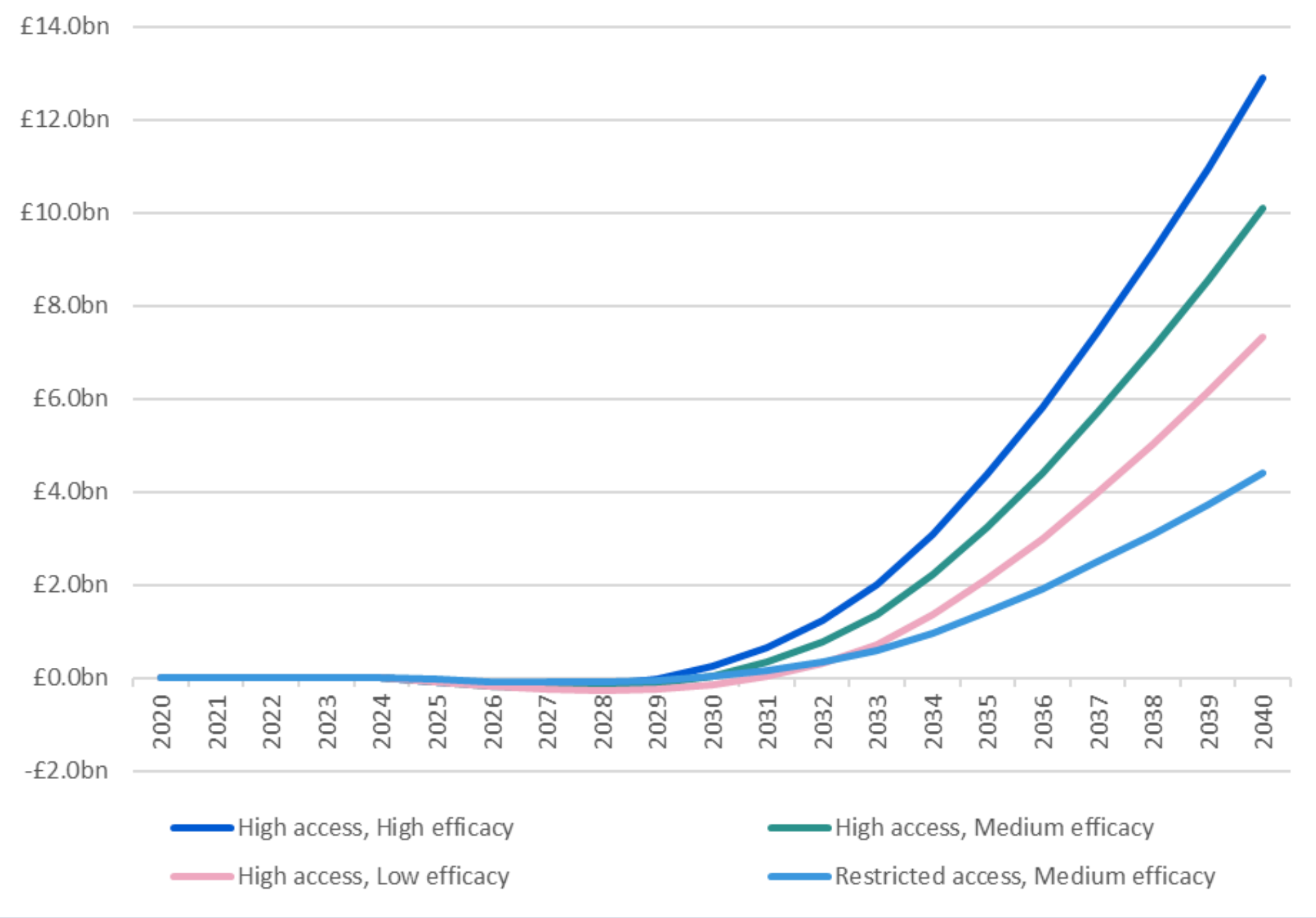
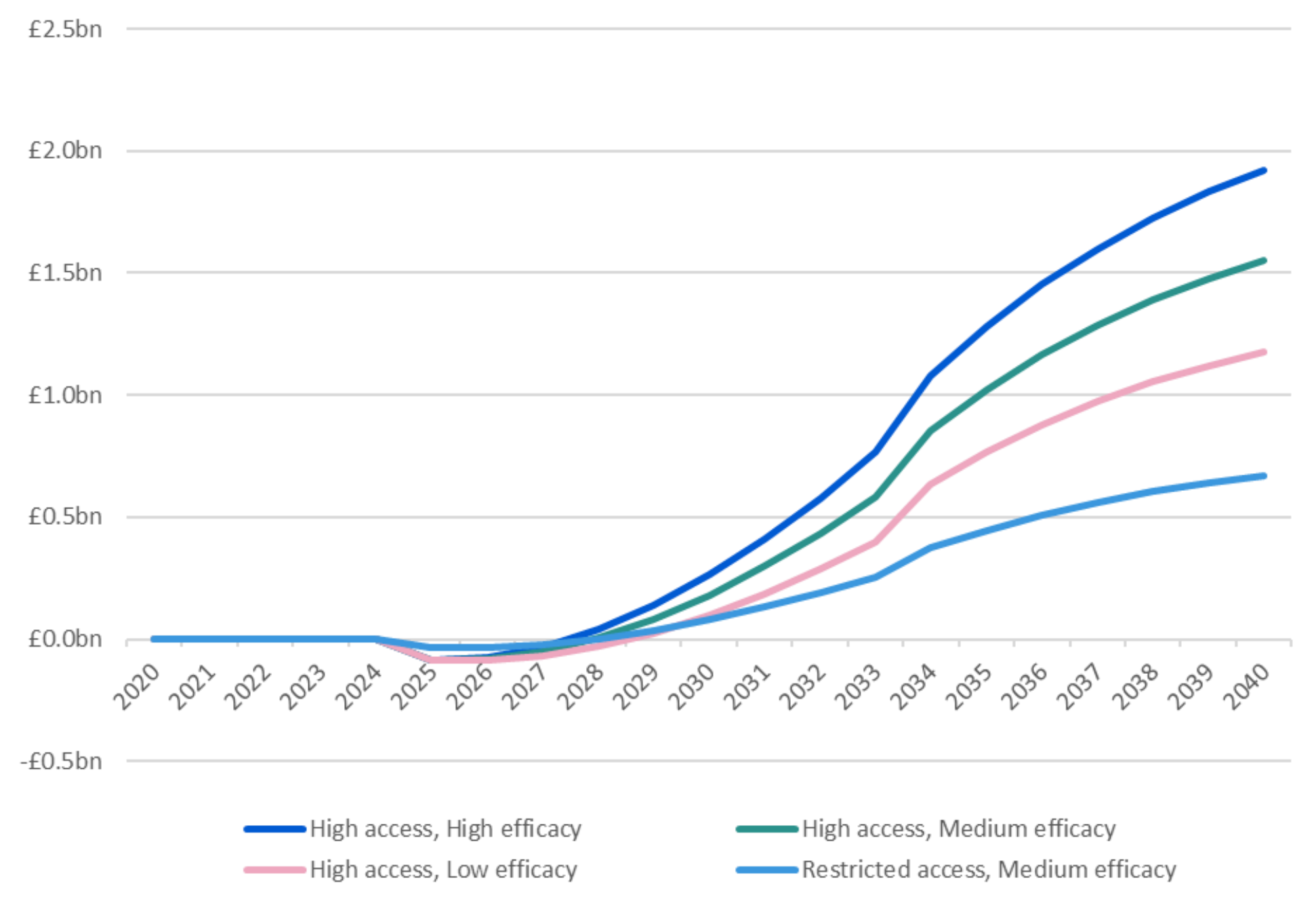


Figure 4: Cumulative costs saved compared to no DMT access from 2020-2040 in majority primary care scenarios



- Negative cost savings for the high and restricted access scenarios from 2025-2029 are due to the higher cost of initial specialist care appointments when commencing DMT treatment (excluding the cost of DMT).
- The maximal cumulative cost savings of £12.9bn in the high-access, high efficacy scenario with majority primary care corresponded to annual health and social care cost savings of £1.9bn in 2040.
- With majority specialist care, the maximal cumulative cost savings were £3.2bn in the high-access, high efficacy scenario, and annual health and social care cost savings in this case were £1.0bn in 2040.

Figure 5: Annual costs saved compared to no DMT access from 2020-2040 in majority primary care scenarios



Discussion

Interpretation and validation of findings

- Improving access to DMT and the choice of treatment care model were projected to make larger differences to future costs compared to differences in projected treatment efficacy. Health systems and payers are able to influence the former two factors to maximise cost savings from DMTs.
- Our AD dementia population projections corroborate with published projections of ~1.4m living with AD dementia in the UK by 2051¹, while the projected DMT efficacy levels we investigated (20-30%) are slightly conservative compared to the projected efficacy of lecanemab and the trial-reported efficacy of donanemab of 27% and 35% respectively.
- Average annual health and social care cost savings of £0.6bn for the high access (up to 58% treated) and high treatment efficacy scenario are lower compared to other published estimates of £1.0–1.6bn for broadly similar full access treatment scenarios, although there is between-study variation in the assumptions used⁹.
- If informal care costs for people with AD dementia were included, baseline projected costs could increase to £3,010bn (8.5% increase) by 2040 (including £296bn in health and social care costs and £237bn in informal care costs for people with AD dementia)⁹. Informal care costs for people with MCI due to AD are not estimated due to lack of data.

Strengths and limitations of analysis

- This projection model depends on expert opinion and the availability of published epidemiological and cost assumptions. Currently there are no AD DMT precedents widely used in clinical practice to inform these.
- Published assumptions account for measurement error in AD transitions (e.g. small transitions to less severe AD stages), and AD stage transition estimates that consider misclassified AD stages are not in a suitable format to input into the model.

Conclusion

- With an ageing population, **the number of AD dementia cases in the UK is projected to almost double by 2040** without a DMT.
- If a DMT were to be introduced in 2025, the **cumulative health and social care cost savings were estimated to be £4.4bn-£12.9bn** over 2020-2040 under majority primary care follow-up.
- Potential cost savings were largest when **follow-up care after DMT initiation was provided in primary care** instead of secondary care
- Leaving aside the costs of treatment itself, **access to DMTs could substantially reduce the economic burden of AD** on health and social care systems in the UK.

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References:

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