Societal economic impact of treatment with adjuvant osimertinib in patients with early-stage (IB–IIIA) EGFRm NSCLC

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Introduction

- Early-stage non-small cell lung cancer (NSCLC) is associated with a substantial societal economic burden.
- In 2013, lost productivity costs due to resected stage IB–IIIA NSCLC were estimated at £65.1 million in the United Kingdom (UK).[1]
- For patients with completely resected IB–IIIA NSCLC and epidermal growth factor receptor mutations (EGFRm), treatment with adjuvant osimertinib can significantly increase disease-free survival (DFS).[2,3]
- The clinical benefits of adjuvant osimertinib are expected to result in societal economic savings by increasing labor productivity and lowering costs related to disability pension benefits, transportation to and from medical centers, sick leave benefits, and informal care.

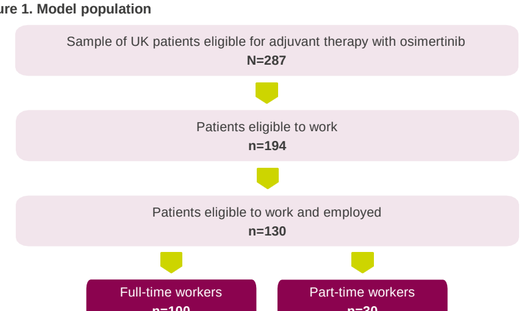
Objective:

To estimate the societal economic impact of adjuvant osimertinib use vs placebo in resected IB–IIIA stage EGFRm NSCLC in a UK setting

Methods

- A semi-Markov, multi-state transition model was developed to estimate the societal economic impact of integrating the adjuvant osimertinib treatment regimen into patient care. The model was based on the global cost-effectiveness model for adjuvant osimertinib.[4] The model components consisted of:
  - A model population representing a sample of UK patients eligible for adjuvant treatment with osimertinib
  - Health state categories associated with different probabilities of returning to work following treatment with adjuvant osimertinib or placebo
  - Health-state dependent pathways for returning to work, or not returning to work, and the associated labor productivity and costs (excluding direct medical costs)
  - UK-specific model inputs informed primarily by the Office for National Statistics (ONS)[5]
- Five health states were considered: disease free (DF), locoregional recurrence (LRR), first-line treatment for distant metastatic NSCLC (DM1), second-line treatment for distant metastatic NSCLC (DM2), and death.
- The time that patients spent in each health state was based on efficacy data from the ADAURA clinical trial (NCT02511106, data cut-off April 11, 2022).[2,3]
- The model population was derived from UK epidemiological data and the proportion of patients in the ADAURA clinical trial who were eligible for work (aged 16 to 75) and were employed (**Figure 1**).

Figure 1. Model population

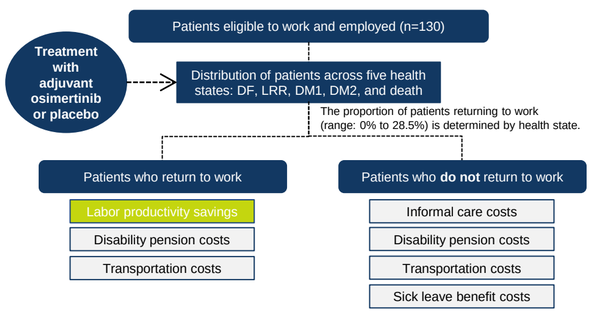


Abbreviation: UK, United Kingdom

Methods (cont.)

- The model simulated the movement of patients across health states following treatment with adjuvant osimertinib or placebo and estimated the resulting labor productivity and costs (**Figure 2**).
- UK-specific employment inputs were derived primarily from the ONS website.[5] Where ONS data were unavailable, information from relevant health technology assessments and peer-reviewed publications was used instead.[1,6,7]
- The model used a lifetime horizon of 13 years and a discount rate of 3.5% for costs (**Table 1**).
- Additionally, a one-way sensitivity analysis (OWSA) was conducted to determine which model parameters caused the largest changes in model output when altered.

Figure 2. Integrated model impacts



Abbreviations: DF, disease free; DM1, first-line treatment for distant metastatic non-small cell lung cancer; DM2, second-line treatment for distant metastatic non-small cell lung cancer; LRR, locoregional recurrence

Table 1. Base-case model parameters

Parameter	Base-case setting
Discounting	3.5%[a]
Maximum working age	75
Retirement age	67[b]
Time horizon	Lifetime (13 years)[c]
Employment rate for patients aged 30 to 64	79%[b]
Employment rate for patients aged ≥65	11%[b]
Ratio of full-time:part-time workers	77:23[b]

[a]Based on the Green Book (HM Treasury, 2022) https://www.gov.uk/government/publications/the-green-book-appraisal-and-evaluation-in-central-governent/the-green-book-2020; [b]Based on the Office for National Statistics (UK Government, 2022) https://www.ons.gov.uk/. [c]Based on patient age at baseline (62 years) and the maximum working age (75 years)

Results

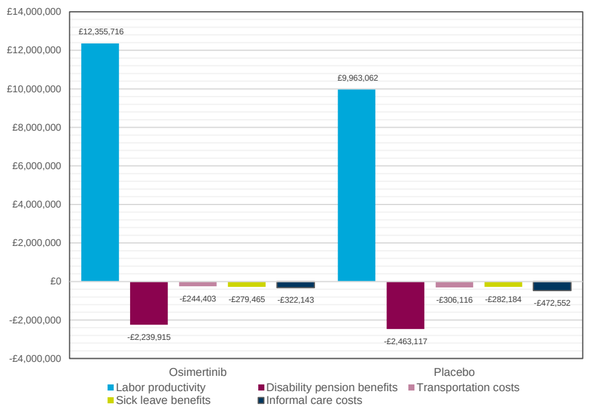
- The model estimated that adjuvant osimertinib would result in an increase in labor productivity and reductions in societal costs.
- There was a societal cost savings of £2,830,697 with adjuvant osimertinib, amounting to £21,775 for each patient in the model population who was eligible to work and employed (n=130).

£21,775
Per patient savings with adjuvant osimertinib

Results (cont.)

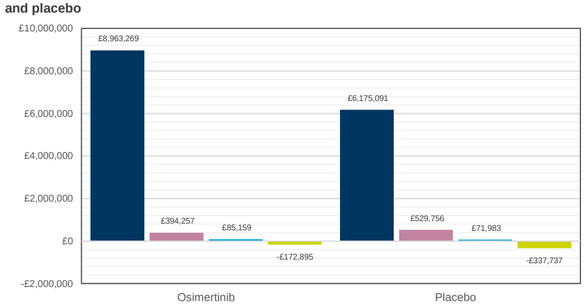
- The improved efficacy of adjuvant osimertinib allowed patients to return to work at a higher proportion than placebo. The observed overall savings was driven by increased labor productivity in the DF health state from patients who received osimertinib, which equaled a net difference of £3,482,255 compared with placebo.
- Labor productivity made up the majority of the savings, but adjuvant osimertinib treatment was also associated with lower disability pension, transportation, sick leave, and informal care costs (**Figure 3**).

Figure 3. Labor productivity and costs with adjuvant osimertinib and placebo



- Adjuvant osimertinib was also associated with a net benefit in the DM2 (£164,843) and DM1 (£13,176) health states compared with placebo (**Figure 4**). Patients receiving adjuvant osimertinib spent less time in the LRR health state (due to more time spent DF) resulting in less work productivity and a net loss in savings of £135,500 (**Figure 4**).

Figure 4. Aggregated labor productivity and costs by health state for adjuvant osimertinib and placebo

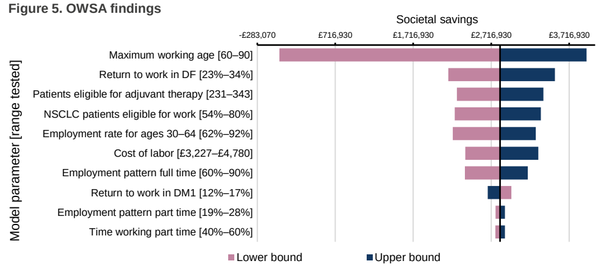


Abbreviations: DF, disease free; DM1, first-line treatment for distant metastatic non-small cell lung cancer; DM2, second-line treatment for distant metastatic non-small cell lung cancer; LRR, locoregional recurrence

Sensitivity analysis

- According to the OWSA, increases to the age at which all patients cease working (maximum working age) had the greatest impact on model output. Increases in the maximum working age were associated with higher labor productivity (**Figure 5**).

Figure 5. OWSA findings



Abbreviations: DF, disease free; DM1, first-line treatment for distant metastatic non-small cell lung cancer; NSCLC, non-small cell lung cancer

Limitations

- There was inherent uncertainty associated with many of the model parameters, including the health-state based proportions that determined patient movement through the model.
- This model estimated the societal savings with adjuvant osimertinib in a UK setting. The findings may not apply to other healthcare systems and countries, particularly where inputs vary greatly from the UK.
- The model estimated indirect economic impact only. Direct medical costs and the broader health benefits of adjuvant osimertinib were not included.
- Some conservative assumptions were incorporated into the model based on ONS data and informal care statistics from the Zorginstituut Nederland.[5,8]
- In the DF health state, patients were simulated to return to their previous work schedule following treatment, possibly resulting in an overestimation of labor productivity. Further research on post-treatment employment patterns is needed to address this issue.

Conclusions

- **The results of this model indicated that adjuvant osimertinib use for patients with early-stage (IB–IIIA) EGFRm NSCLC was associated with substantial societal economic gains compared with placebo.**
- **The increased time that patients spent in the DF health state, and the associated gains in labor productivity, were responsible for much of the savings with adjuvant osimertinib.**
- **Adjuvant osimertinib use also reduced the costs of disability benefits, transportation, sick leave benefits, and informal care.**
- **Changes in the maximum working age had the largest impact on model output.**
- **The results of the model suggest that clinical efficacy of adjuvant osimertinib may result in a positive societal impact.**

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