HTA112

Can Excess Hazard Models Enhance Survival Analysis in Health Technology Assessment?

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Background & Rationale

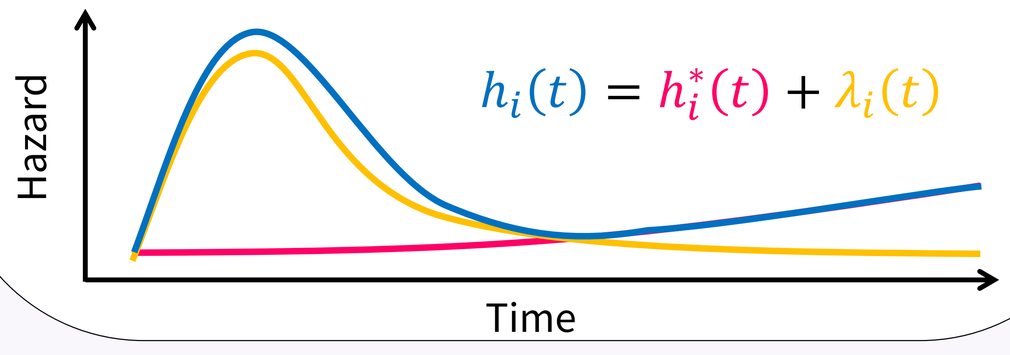
Extrapolation of survival data is common within health technology assessments (HTAs) but is often associated with uncertainty at later time points which can result in large variations of the incremental cost effectiveness ratio (ICER) and subsequently impact reimbursement decisions.

NICE Technical Support Document 21 advocates the use of excess hazard modelling (EHM) which incorporates data from general population mortality to estimate long-term survival outcomes.

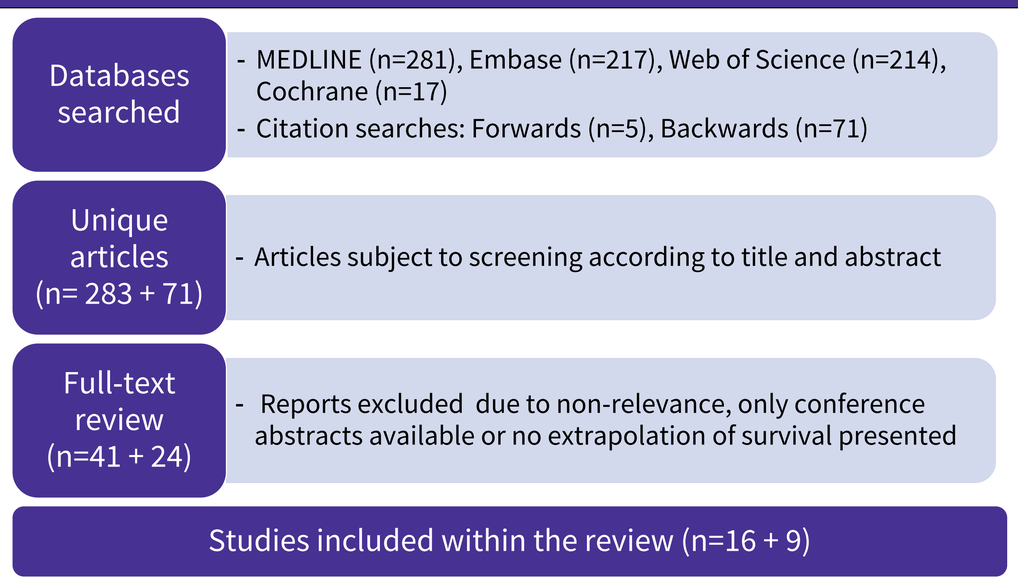
A review was conducted to assess the use of EHM approaches within survival analysis and its application in HTA.

Excess Hazard Modelling –

- EHM estimates the additional mortality risk associated with a specific disease or condition, beyond the background mortality in the general population.
- All-cause mortality rate, $h_i(t)$, is broken into the background mortality rate, $h_i^*(t)$, and the excess mortality rate, $\lambda_i(t)$.



Study Inclusion - PRISMA



Databases were searched for the term “excess hazard”, with no date restrictions. Numbers of studies presented as number from databases + number from citation search.

Key message

- EHM provides an alternative approach for the prediction of long-term survival, and provides **more accurate long-term survival predictions**, **even in the case of immature data.** This has the potential to reduce uncertainty during the reimbursement process.
- Further research is required to investigate how the accuracy of the EHM approach is affected in the case of small sample sizes or lack of IPD.

Results

25 studies were identified that used EHM approaches to extrapolate survival data

Majority of studies were methods-based using registry data case studies

17 studies focussed on oncology

13 studies highlighted the benefit of EHM and actively encouraged further development of methods

1 study applied EHM to RCT data (van Oostrum *et al.* 2021) [4]

Using EHM approaches for RCT data – A case study identified within the review [4]

- Data from two RCTs were analysed using EHM, both trials had >500 participants
- Considerable differences between long-term survival predictions when the EHM approach was employed compared to standard parametric survival extrapolation.
- The standard approaches often predicted survival being greater than the general population whereas the EHM approach explicitly prevented this.
- EHM was crucial for accurate extrapolations of immature data, which is common within HTA.

References

1. Sweeting, M. J. *et al.* (2023). Med. Decis. Making, 43(6), 737-748.
2. Bullement, A. *et al.* (2019). Value Health, 22(3), 276-283.
3. Chen, E. Y.-T. *et al. (*2024). Med. Decis. Making, 44(3), 269-282.
4. van Oostrum, I. *et al.* (2021). Value Health, 24(9), 1294-1301.

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