NICE National Institute for Health and Care Excellence

EHDEN EUROPEAN HEALTH DATA & EVIDENCE NETWORK

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Predicting Long Term Cancer Survival for Health Technology Assessment: A Multinational Cohort Study

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Background

The National Institute for Health and Care Excellence (NICE) participates in international research projects, such as the European Health Data and Evidence Network (EHDEN), to collaborate on developing innovative methods and new ways of working. This supports our transformation plan to focus on what matters most, create advice that is useful and useable, and learn from data and implementation. EHDEN is a federated network of real-world data partners from across Europe, standardised to the Observation Medical Outcomes Partnership Common Data Model (OMOP CDM). Using data from EHDEN data partners, we aimed to determine the suitability of parametric survival models for capturing observed long-term cancer survival estimates and, therefore, appropriateness for use in Health Technology Assessments.

What we've done

Observational survival data for 7 common cancers (breast, colorectal, lung, liver, pancreas, prostate, stomach) and one rarer cancer (head and neck) for people diagnosed between 2000 and 2019 were obtained from eleven databases across eight European countries (UK, Norway, Switzerland, Spain, the Netherlands, Finland, Portugal, Estonia).

Parametric curves (Gompertz, Weibull, exponential, log-logistic, log-normal, generalised gamma, spline 1 knot, spline 3 knots) were fitted to each cancer and database with data. Model fit was assessed using Akaike Information Criterion (AIC), and predictive performance evaluated by comparing restricted mean survival time (RMST) between Kaplan-Meier and parametric estimates at 10 years.

Outcomes

Over 1.6 million cancer patients were included in the study. Baseline characteristics (age, sex, comorbidities, medication usage) showed similar patterns across databases and cancer types.

As expected, flexible spline models generally provided the best fit and predictive performance of long-term survival. Among standard models, the log-normal, log-logistic, and generalised gamma performed best, while exponential, Weibull, and Gompertz models had poorer predictive performance.

We also developed an EHDEN Cancer Survival Dashboard, allowing users to quickly examine the survival data and explore long-term projections from the participating databases (see below).

Impact

This use case demonstrates a potential benefit of EHDEN and OHDSI tools to address priority areas of HTA agencies and industry.

To our knowledge this is the first study to examine which survival distributions are most capable of capturing long-term real-world survival estimates across multiple cancers, from multiple databases, across multiple European countries.

This could have real benefits to HTA agencies as these results may be used to rule out implausible distributions and potentially address uncertainty in the decision-making process (although this should be done on a case-by-case basis).

Further research investigating generalisability of results for use in HTA is required, particularly regarding estimates for cohorts stratified by cancer stage and treatment.

EHDEN Cancer Dashboard
You can access the EHDEN Cancer Survival Dashboard by scanning the QR code.

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