From Theory to Practice: Guidance for Identifying and Selecting Mapping Algorithms for Health Economic Models

HTA158

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Introduction

- The National Institute of Health and Care Excellence (NICE) methods guide recommends EQ-5D-3L as the preferred measure of health-related quality of life for health economic models.[1,2] However, as EQ-5D-3L data on the condition, intervention, or health states of interest may not be directly available, mapping may be required to help translate data from other non-preference or preference-based measures to EQ-5D-3L (or other appropriate preference-based measures).
- Despite existing NICE Decision Support Unit guidance on mapping (technical support document [TSD]10[3] and TSD22[4]), as well as other published guidance,[5] there is an unmet need for guidance on identification and selection of published mapping algorithms to generate utility values for use in health economic models.
- Although the Health Economics Research Centre (HERC)[6] database provides a valuable resource for identifying mapping algorithms, the search strategy adopted has not been externally validated and may not guarantee comprehensive coverage. Supplementary literature review may also be necessary for health technology assessment (HTA) submission purposes to ensure that searches are contemporaneous.

Objectives

- **Conduct a targeted search to confirm the most relevant sources available for mapping algorithms and the suitability of the HERC search strategy.**
- **Review pertinent discussion in existing guidance on mapping algorithms to inform selection criteria as well as identification and selection approaches adopted in recent NICE appraisals.**
- **Leverage findings to propose guidance for identifying and selecting mapping algorithms.**

Methods

- Mapping algorithm identification:
  - A targeted review was conducted to capture publications focusing on identifying and selecting mapping algorithms.
    - The HERC database is a valuable resource for identifying mapping algorithms. We reviewed the searches it used for appropriateness and comprehensiveness and concluded that while the searches might benefit from certain sensitivity enhancements, they were sufficiently robust for identifying relevant publications.
    - The search strategy was run from January 2023 (the date of the last searches run by HERC) to September 2025. The search strategy was translated and implemented in Embase and MEDLINE via Ovid for comprehensive retrieval.
    - Keywords related to mapping, crosswalk, utility transfer, EQ-5D, or EuroQol were used to identify relevant publications, without restriction by indication or geographic region.
  - Findings from a parallel study were also incorporated, reviewing identification criteria used in NICE technology appraisals published or updated between March 2020 and February 2025.
- Mapping algorithm selection:
  - Existing published guidance on mapping (NICE TSD10[3], NICE TSD22[4] and Petrou 2015[5]) was reviewed to identify any potentially relevant criteria for mapping algorithm selection.
  - Findings from a parallel study describing selection criteria used in NICE technology appraisals published or updated between March 2020 and February 2025 were also used.

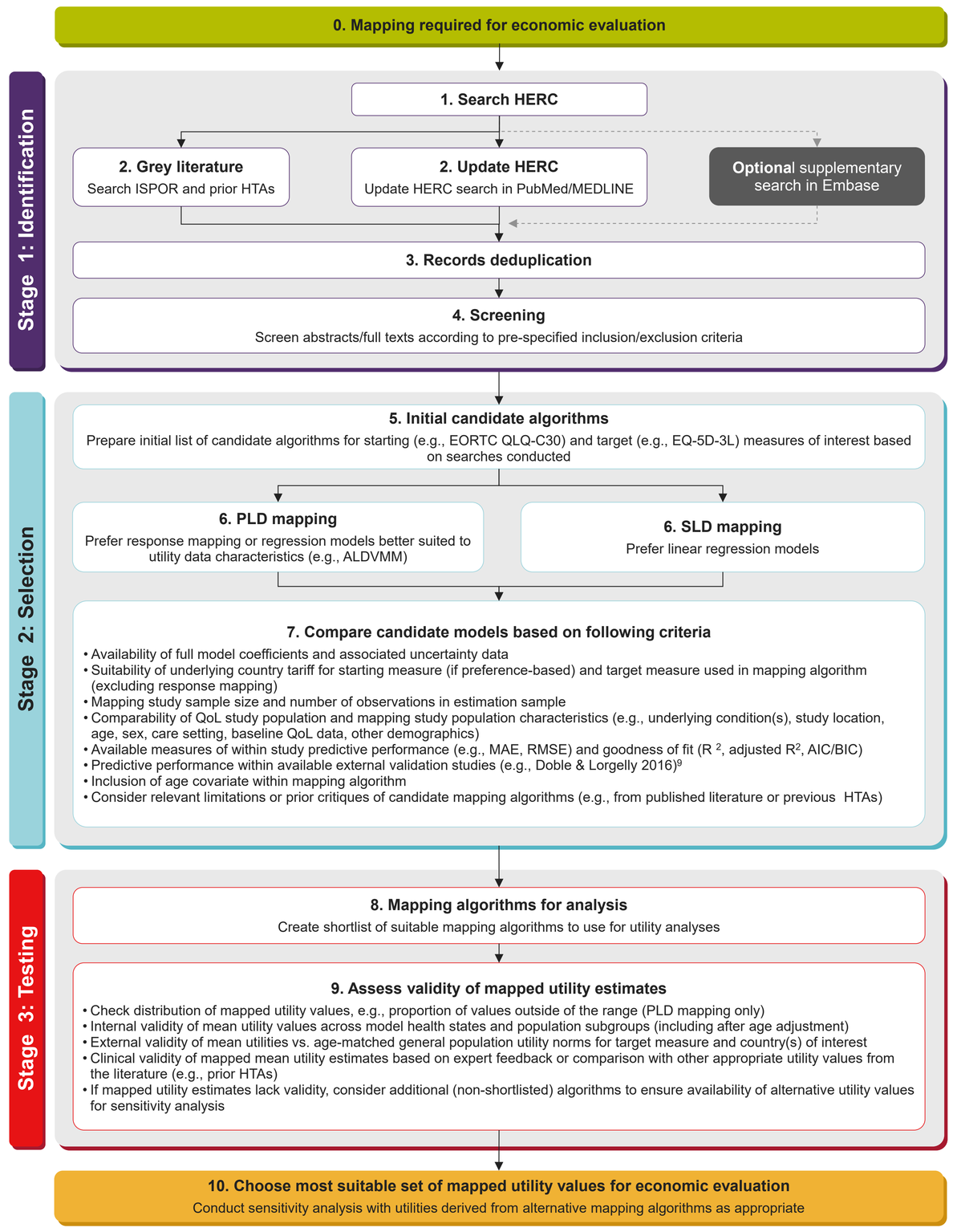
Results

- Mapping algorithm identification:
  - It is recommended that the searches are rerun from January 2023 onwards to ensure inclusion of recent publications and that records are screened by a single researcher with at least 10% of identified publications reviewed by second screener.
  - The results indicated limited differences in identification of relevant mapping publications between PubMed and MEDLINE/Embase. However, complementary searches in MEDLINE/Embase captured additional relevant conference proceedings not indexed in PubMed.
    - A rerun of the PubMed search for the period 2023–2025 retrieved 137 records. The Medline search yielded 135 records, closely aligning with PubMed results, as expected. The Embase search retrieved 276 records. After deduplication, the combined total across all sources was 286 unique records.
    - A review of these additional publications identified ten studies containing mapping algorithms with model coefficients provided: four full publications and six International Society for Pharmacoeconomics and Outcomes Research (ISPOR) abstracts/posters.
      - None of the full publications were retrieved by the original HERC search, despite being indexed in PubMed, suggesting some potential limitations in the original search strategy.
    - While Medline and Embase both captured relevant mapping studies, Embase captured numerous additional conference abstracts and posters, as reported above.
  - Results of the parallel study reviewing recent NICE appraisals highlighted that although the HERC database, literature reviews, prior NICE appraisals, and external validation studies were considered as sources to identify mapping algorithms, they were inconsistently used across appraisals.[7]
- Mapping algorithm selection:
  - Review of the published guidance highlighted the need to consider the type of mapping model used, measures of predictive performance/model fit, study population characteristics, and the potential value of age as a covariate within mapping models.
  - Excluding EQ-5D-5L to EQ-5D-3L cross-walk algorithm usage, results of the parallel study reviewing NICE appraisals between March 2020 and February 2025 indicated that selection criteria were inconsistently applied with more than half either not reporting selection criteria or relying on precedence from previous NICE appraisals.
  - Although NICE DSU TSD10[3] and TSD22[4] outline important limitations of linear mapping algorithms, as highlighted in NICE technology appraisal (TA)640,[8] there may be instances where patient level quality of life (QoL) data are not available from the trial nor appropriate utilities from the literature, and where mapping of summary level non-preference based QoL data from the literature may be more suitable. Due to the non-collapsible nature of non-linear models, linear models may be preferred in such cases.

Results (cont.)

- Assessing the validity of the mapped utility estimates is valuable to help determine the most suitable mapping algorithm. However, exploration of the full range of initial candidate models may not be practical for measures where a large number of mapping algorithms are available (e.g., QLQ-C30). Thus, it may be more pragmatic to conduct an initial selection phase to shortlist mapping algorithms before validating mapped utility estimates. If the shortlisted algorithms fail to produce suitable utility estimates, the excluded algorithms can be reconsidered.
- Informed by the findings outlined above, a set of pilot guidance was then developed outlining a practical process for identification, selection, and testing of mapping algorithms (**Figure 1**).

Figure 1. Mapping Algorithm Identification and Selection Flow Diagram



Abbreviations: AIC = Akaike information criterion; ALDVMM = adjusted limited dependent variable mixture models; BIC = Bayesian information criterion; EORTC QLQ-C30 = European Organisation for Research and Treatment of Cancer Quality of Life Questionnaire; HTA = health technology assessment; HERC = Health Economic Research Centre; ISPOR = International Society for Pharmacoeconomics and Outcomes Research; MAE = mean absolute error; PLD = patient level data; QoL = quality of life; RMSE = root mean squared error; SLD = summary level data

Conclusions

- **Clear reporting of mapping methods used to inform utility analyses for economic models is essential to ensure transparency and reproducibility.**
- **The proposed pilot guidance aims to offer a clear, comprehensive process for mapping algorithm identification and selection.**

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