important to decision-makers (such as hospital census, total infections), but each takes a different approach to analysis of uncertainty. We extend best practices from health economics to infectious disease modeling and develop a suite of tools and visualization techniques which represent parameter uncertainty and the risk these unknowns present to decision-makers.
Results: In consultation with decision-makers and infectious disease modeling experts we developed the 'Decision Uncertainty Toolkit' of model outputs and visuals. Visual tools for uncertainty are developed to: (i) accurately capture uncertainty in key infectious disease model outputs, and (ii) support intuitive and direct interpretation by infectious disease modelers and decision-makers. We also developed quantitative measures for the downside risk of policy alternatives, specified to capture both the probability and magnitude of losses relative to policy targets for a range of infectious disease model outputs. Together, these outputs can support decision-making by quantifying outcome uncertainty and the risks associated with policy alternatives.
Conclusions: We developed the toolkit visuals and risk measures alongside infectious disease modelers and decision makers. The toolkit is designed to improve decision-maker understanding of decision risk in order to improve outcomes during future public health crises.

OP47 The Risk-Based Price: Incorporating Uncertainty And Risk Attitudes In Health Technology Pricing

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Introduction: Decision makers often use value-based decision rules to determine whether technologies offer good value for money and should therefore be adopted, comparing cost-effectiveness analysis results with a threshold value. This assumes that decision makers are indifferent to interventions with the same expected value but different levels of underlying uncertainty. Such indifference is unlikely to hold in practice. We propose a risk-based price and accompanying decision rules to address this limitation.
Methods: We characterized risk using the per-patient expected value of perfect independent information (EVPII), a modification of a standard output from value of information analysis. The EVPII estimates the expected value of net benefit losses caused by uncertainty related to a technology, independent of the uncertainty related to alternative treatments. 'Payer risk tolerance' is then defined as the maximum per-patient risk of making wrong decisions that payers are willing to accept, expressed in monetary terms. The risk-based price is the price at which the EVPII is equal to the payer risk tolerance.
Results: The risk-based pricing decision rules are as follows: (i) a technology is acceptable for adoption at the submitted price if the incremental net benefit of the technology is greater than or equal to zero and the EVPII is less than or equal to the payer risk tolerance; and (ii) the optimal technology has the greatest expected net benefit at the lowest of the sponsor submitted, value-based, or risk-based price at a given cost-effectiveness threshold value.
Conclusions: The risk-based price incorporates uncertainty and risk attitudes into decision-making. We demonstrate that both risk-averse and risk-neutral payers prefer the outcomes of risk-based pricing. Risk-based decision rules incentivize sponsors to develop evidence. Implementation of the risk-based price improves outcomes for patients by increasing health system net benefits under constrained resources, with better alignment to decision maker risk attitudes.

OP51 Use Of Real-World Data In Cost-effectiveness Analysis Of Sequential Biologic Treatment For Rheumatoid Arthritis

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Introduction: In health technology assessment (HTA), economic evaluations assessing biologic drugs for rheumatoid arthritis (RA) involve modeling patients' responses to multiple treatments given sequentially over a lifetime horizon. When data from randomized controlled trials (RCTs) are scarce, data from non-randomized studies (e.g., single-arm trials [SATs] and disease registries) can be used to supplement the evidence base. This research aimed to demonstrate meta-analytic methods for combining effectiveness data from randomized and non-randomized studies and their corresponding impact on cost-effectiveness estimates.
Methods: Data comparing patients receiving second-line rituximab with continued background non-biologic treatment were extracted from one RCT and six SATs identified in an HTA assessing second-line rituximab for RA, and from the British Society for Rheumatology Biologics Register-Rheumatoid Arthritis, by applying a target trial emulation approach. A binomial meta-analysis model was used to estimate the probabilities of achieving the European League against Rheumatism (EULAR) response criteria by pooling data from the RCT, SATs, and the registry. The probabilities were entered into a decision model from a previous HTA to derive incremental cost-effectiveness ratio (ICER) estimates for treatment strategies with and without biologic drugs.
Results: Compared with the original analysis, the estimated probability of at least a moderate EULAR response on rituximab from combined sources was substantially lower. For example, the probability obtained from an RCT was 0.68 (95% credible interval [CrI]: 0.345, 0.907), but only 0.29 (95% [CrI]: 0.242, 0.333) when using RCT plus registry data and 0.29 (95% CrI: 0.244, 0.336) for combined RCT, registry, and SAT data. In the cost-effectiveness analysis, the median ICERs were higher when including real-world data.
Conclusions: Synthesis of all relevant data, including RWD, provides additional information regarding the variability in cost-effectiveness estimates and can be considered in sensitivity analyses for HTA decision-making.

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