of intergenerational discounting. CONCLUSIONS: Cost-effectiveness analysis will increasingly play an informative role in policy analysis of public health interventions even though it is not clear what discount rate is appropriate in each case. However, especially for programmes characterized by long-term diminished risk of disease, death or sequel avoided, possibility of disease eradication, and substantial intergenerational impact, there are no convincing arguments favouring the use of subjective time preferences when setting official discount rates for application in social project evaluation.

PMC10
PREVALENT AND MULTIPLE FUTURE INCIDENT COHORTS IN COST-EFFECTIVENESS ANALYSIS
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OBJECTIVES: In cost-effectiveness analysis, we aim to account for all future costs and benefits for all patients who are currently eligible for a new health technology and who will become eligible in the future. METHODS: We adapt the fundamental concept from epidemiology of the incidence and prevalence of a disease to cost-effectiveness analysis. We define the prevalent cohort as those patients eligible to switch from the comparator to the new technology at the time the new technology is introduced. Next, we introduce the concept of multiple future incident cohorts. The incident cohort starting t years in the future consists of those patients who first become eligible for the new technology t years in the future. Currently cost-effectiveness analyses worldwide consider only either the prevalent cohort, the incident cohort in only the first year, or a mixture of the two. RESULTS: On average, patients in the prevalent cohort are older and at a more advanced stage of illness than patients in the incident cohort. If the cost and benefit discount rates differ, we show mathematically that the cost-effectiveness of all technologies will be substantially affected by our method. Otherwise, the incremental cost-effectiveness ratio will not change for acute conditions, but may change substantially for chronic conditions, particularly for chronic progressive conditions. CONCLUSIONS: We suggest that analyses capture the costs and benefits arising from the prevalent cohort and all future incident cohorts. If our method had been used in the past, some health technologies would have appeared substantially more cost-effective, others substantially less cost-effective. If possible, parameter values (e.g. average age, disease severity) for both the incident and prevalent cohorts should be obtained from the literature. Otherwise, we describe how such parameters can be estimated.

PMC11
IMPROVING PROBABILISTIC SENSITIVITY ANALYSIS (PSA) IN THE TREATMENT OF UNCERTAINTY COSTS USING MCMC
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OBJECTIVES: Economic evaluation (EE) incorporate some degree of uncertainty and variability that arises in a number of ways. Uncertainty represents lack of perfect knowledge on the part of the analyst and may be reduced by further measurement and variability represents heterogeneity or diversity in a population that is irreducible by additional measurements (Spanish guidelines proposal). This paper tries to shed light on the need to separate uncertainty and variability in the EE. METHODS: We propose the Probabilistic Sensitivity Analysis (PSA) as an efficient methodology to treat uncertainty associated to the model “inputs”. In PSA, a single variable (or subset of variables) is allowed to vary within its specified probability distribution, and repeat-run sampling-based simulations are performed to produce a weighted distribution of output estimates. It is proposed a Bayesian estimation of the results of a target parameter [θ|Data] = [Data|θ]*[θ]/[Data] subsequently to PSA as an improvement of the method. We propose calculating the Bayesian interval of probability (BIP) [θ[a,b]) of the costs associated with treatment during the PSA calculations (it has been assumed that [θ[a,b] = Beta(a,b)[UNKNOWN NODETYPE 9]), defined as those that have an interval probability “high” to contain the parameter; equivalent to frequentist confidence interval P(θmin ≤ θ ≤ θmax) = 1 – α[UNKNOWN NODETYPE 9], using Markov Chains Monte-Carlo but measured as a probability not as confidence (α based). RESULTS: We have studied different scripts using WinBugs and FirstBayes packages for calculating of the estimated costs BIP in a PSA, simulating highly skewed distributions of costs. The separation of uncertainty and variability can affect the study results and policy-making decisions in a non-negligible manner and the best methodology to treat the uncertainty is PSA. CONCLUSIONS: Furthermore this paper is a brief introduction to the decision models, their relation to Bayesian decision theory, and the tools typically used to describe the uncertainties involved presenting an improvement in the PSA using a BIP of the estimated parameters as a robust method.
simple and useful tool for quantifying and exploring the (combined) uncertainty associated with decision-making about adopting guidelines and implementation strategies and, therefore, for informing decisions about efficient resource allocation to change clinical practice.

**PMC13**

**ESTIMATING COST-OF-ILLNESS USING GENERALIZED LINEAR MODELS: AN ALTERNATIVE TO THE SMEARING APPROACH**

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**OBJECTIVES:** Estimation of cost-of-illness typically involves the analysis of skewed medical costs that include large outliers. Log transformations are frequently used to overcome these problems. Linear regression models (OLS) are then applied to the transformed data. The estimated model coefficients are retransformed back to the linear scale using the smearing approach. Implementing this approach in statistical packages requires customized programming. We propose an alternative to using log transformations: Generalized Linear Models (GLM) with a log link function. We compare the performance of both models in estimating cost-of-illness.

**METHODS:** We derived data from a large administrative database representing 143,593 discharges from 39 US hospitals from January 2004 to December 2005. We estimated total medical costs among hospitalized patients attributable to hyponatremia. Using a cross-validation approach, we compared the performance of two models: log transformed OLS with smearing and GLM with a log link function and a normal error distribution. We used the Root Mean Squared Error (RMSE) and the Mean Absolute Error (MAE) to assess model performance. Covariates in both models included patient age, gender, race, geographic region, Deyo-Charlson comorbidity index, primary diagnosis, teaching status of hospital, and admission source. All analyses were conducted using SAS®.

**RESULTS:** The GLM with log-link and a normal error distribution had both the smallest RMSE (23,688) and MAE (11,304) compared to the log transformed OLS with smearing (24,057 and 11,392, respectively). Furthermore, by using GLM, there was no need to compute a retransformation estimate, since the log link function relates the response mean to the original scale. The difference between the NB of step 1 and 2 gives the upper bound of the value of improving implementation. Step 3 tells us whether it is cost-effective to invest in specific interventions to improve implementation. The implementation factors are stochastic, therefore in each step parameter uncertainty is addressed in probabilistic sensitivity analyses, and the value of reducing uncertainty is examined in value of information analyses.

**RESULTS:** As a case we used a Markov model that examines the cost-effectiveness of direct hearing aid provision versus provision by referral. Two stochastic implementation parameters were incorporated: patient compliance and professional uptake. The upper bound of the value of improving implementation was €50 million (patient compliance), €23 million (professional uptake) and €72 million in total. This suggests that implementation interventions may be valuable (results presented at the conference).

**METHODS:** CONCLUSIONS: This framework allows for real-word economic evaluations to inform policy decisions.

**PMC14**

**A FRAMEWORK FOR REAL-WORLD ECONOMIC EVALUATION BY INCORPORATING IMPLEMENTATION PARAMETERS**

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**OBJECTIVES:** Reimbursement decisions are often supported by economic evaluations based on randomised controlled trials (RCTs). A problem with RCTs is that they usually deviate from daily practice. Hence, reimbursement decisions are based on perfect-world assessments of cost-effectiveness. In daily practice, the technology is likely to be less cost-effective for instance due to lower compliance. To make real-world reimbursement decisions, factors that potentially influence the cost-effectiveness should be considered. These factors are implementation factors, and stochastic in nature. This study presents a framework that incorporates the implementation of a technology directly into the economic evaluation, thus anticipating on potentially less than perfect implementation. This results in real-world economic evaluations.

**METHODS:** The framework allows for a stepwise consideration of the net benefit (NB) of a technology in different states of the world: 1) perfect-world (NB under perfect implementation); 2) real-world (NB under expected implementation); and 3) improved-world (NB after intervention to improve implementation). Step 1 tells us whether the technology could be cost-effective. Step 2 gives us the real world cost-effectiveness. The difference between the NB of step 1 and 2 gives the upper bound of the value of improving implementation. Step 3 tells us whether it is cost-effective to invest in specific interventions to improve implementation. The implementation factors are stochastic, therefore in each step parameter uncertainty is addressed in probabilistic sensitivity analyses, and the value of reducing uncertainty is examined in value of information analyses.

**RESULTS:** As a case we used a Markov model that examines the cost-effectiveness of direct hearing aid provision versus provision by referral. Two stochastic implementation parameters were incorporated: patient compliance and professional uptake. The upper bound of the value of improving implementation was €50 million (patient compliance), €23 million (professional uptake) and €72 million in total. This suggests that implementation interventions may be valuable (results presented at the conference).

**METHODS:** CONCLUSIONS: This framework allows for real-world economic evaluations to inform policy decisions.