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
Exuzides A1, Colby C1, Spalding J R2
1ICON Clinical Research, San Francisco, CA, USA, 2Astellas Pharma US, Deerfield, IL, USA

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 then transformed 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. CONCLUSIONS: In this cross-validation study, GLM outperformed OLS with smearing. GLM is easier to implement using SAS® with no need for retransformation estimates. Because of its ease of use and statistical accuracy, GLM is a useful alternative to log-transformed OLS models with smearing, when estimating cost-of-illness.

PMC14

A FRAMEWORK FOR REAL-WORLD ECONOMIC EVALUATION BY INCORPORATING IMPLEMENTATION PARAMETERS
Grutters JP1, Joore MA2
1Maastricht University, Maastricht, The Netherlands, 2University Hospital Maastricht, Maastricht, The Netherlands

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 (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.

PMC15

IN OR OUT? EMPIRICAL EVIDENCE ON INCOME LOSSES IN HEALTH STATE VALUATIONS AND IMPLICATIONS FOR ECONOMIC EVALUATIONS
Tilling CJ1, Krol M2, Tsuchiya A1, Brazier JE1, Brouwer W2
1Sheffield University, Sheffield, UK, 2The institute for Medical Technology Assessment, Rotterdam, The Netherlands, 3The University of Sheffield, Sheffield, South Yorkshire, UK

In 1996 the Washington Panel controversially recommended valuing productivity costs (PC) in terms of QALYs. While this recommendation was criticised, the Panel’s assumption, that respondents to health state valuation (HSV) exercises take income losses into account, could not be countered since there was no evidence regarding what people consider in HSV exercises. If they do consider income losses and if this changes HSV’s, then all past economic evaluations that have included PC in the numerator may have double counted these costs. Alternatively, if respondents do not consider income losses then all past economic evaluations that have not included PC in the numerator have failed to account for sizeable societal costs. OBJECTIVES: To recapture the debate surrounding the appropriate method for including PC in health economic evaluations, to identify empirical evidence addressing the assumptions made by the Washington Panel and to recommend a research agenda for the future. METHODS: In this review we first present and discuss the human capital and friction cost approaches for capturing PC. Then, the Washington Panel approach is highlighted and discussed. Next, we identify, outline and critically appraise the existing empirical studies that attempt to address the assumption that respondents to HSV exercises take income effects into account. Finally, we outline a research agenda for the future that will help to determine the most appropriate method for including PC. RESULTS AND CONCLUSIONS: Only six empirical studies were identified. The studies differ substantially in methods and results and drawing general conclusions from them is difficult. Overall, it seems that not explicitly mentioning the inclusion of income will induce a minority of respondents to...