PARIS ABSTRACTS

A CONCEPTUAL FRAMEWORK TO APPLY DISCRETE-EVENT SIMULATION TO ESTIMATE THE RESOURCES NEEDED TO PERFORM A POPULATION-BASED CANCER SCREENING PROGRAM

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OBJECTIVES: To establish a conceptual framework to estimate the resources needed to start a population-based cancer screening program and to estimate its long-term impact in terms of benefit and resource use. METHODS: A conceptual model was defined according to discrete-event simulation methodology. The conceptual model included, on one hand, the stages of a screening program and, on the other hand, the natural history of the disease. The stages of a screening program included: invitation of the target population, participation and screening test, confirmation of the result(s) after a positive screening result, cancer diagnosis and cancer treatment. The natural history of the disease includes the following states: free of cancer, pre-clinical cancer phase, clinical (or symptomatic) cancer phase and cancer cured, including recurrences and death. The natural history of the disease will be modeled as time until a change of state, and this health state will be managed as attributes. Then, the health state will be taken into account through the process of screening to choose which sensitivities and specificities of the screening and confirmatory tests should be applied. It will also be used to detect interval cancers. CONCLUSION: Using a simulation model to reproduce a population-based cancer screening program will allow estimating the amount of resources needed to implement the program. This will be applicable to cancers for which screening is recommended, such as colorectal cancer, but also to explore changes in the screening strategy such as widening of the age range for breast cancer screening.

MODELLING THE UPTAKE AND DIFFUSION OF INNOVATIVE TECHNOLOGY: A CRITICAL AND STRATEGIC FEATURE OF BUDGET IMPACT ANALYSIS AND RISK-SHARING AGREEMENTS

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The market access of innovative technology is perceptibly tending up. Beyond cost-effectiveness, payers increasingly scrutinize budget impact (BI) and contemplate risk-sharing (RS) agreements. In these conditions, accurate forecasting of an innovation uptake and diffusion (IDU) is decisive as it determines the new technology valuation over time. The IDU rate is a key feature of BI modelling and cannot strategically be ignored in potential RS proposals in which the number of patients being given the innovation over time may determine RS agreement conditions. However, in the BI analysis, models and frameworks carried out so far, it is not necessarily clear how IDU rates were factored in. This contribution builds upon methods developed in the technological forecasting science to predict new technology diffusion with little or no data. We describe the use of sigmoid growth curves (Logistic or Gompertz functions for instance) to account for the gradual and continuous process of an IDU within a specific market. Growth curves are mathematically tractable. They provide modellers and decision makers with remarkable flexibility and transparency to run a broad range of adaptations, sensitivity and scenario analyses on an IDU path in BI models or RS proposals i.e., in simulating and comparing different market dynamics and new technology diffusion. Bayesian updating is also described to improve curve fitting in order to increase the accuracy of IDU forecasts as expert opinions and preliminary claims or sales data become available.

REVIEWS’ CHECKLIST FOR ASSESSING THE QUALITY OF DECISION MODELS

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OBJECTIVES: The NICE Single Technology Appraisal process requires a systematic review of existing economic evaluations to be submitted. A critical appraisal of the identified studies is an important component of this review. Numerous quality assessment tools have been devised to critically appraise the quality of decision models. However, none of these accurately reflect the quality criteria specified by the NICE Reference Case published in the updated 2008 Guide to the Methods of Technology Appraisal. We aimed to develop a checklist for assessing the quality of decision-analytic models that may be used in the context of STA submissions, and which reflects the requirements of the NICE reference case, and incorporates important elements of existing highly regarded tools. METHODS: A systematic review was undertaken to identify existing good practice guidelines and checklists for critical appraisal of health economics studies. We searched MEDLINE, EconLit and Health Economic Evaluations Database (HEED) for published guidelines and checklists, and the Internet for relevant grey literature, discussion papers and conference abstracts. RESULTS: We identified 17 relevant publications. These were summarised and synthesised to determine the modellers and the practical criteria. Based on these findings and the NICE reference case, we propose a simple checklist which provides a means to assess the quality of models and the evidence underpinning them according to the Reference Case and evidence hierarchy specified by NICE, including identification of evidence by systematic review, and selection and synthesis of outcomes data and measuring and valuing health effects. CONCLUSIONS: We believe the proposed checklist will provide a useful means for assessing the quality of health economics evaluations reflecting the most up-to-date Reference Case requirements. The checklist may be used alongside recognised guidelines for critical appraisal of health economics evaluations.

BAYESIAN CALIBRATION OF A NATURAL HISTORY MODEL FOR COLORECTAL CANCER

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OBJECTIVES: The optimal timing of a mid-therapy assessment depends on test performance and the relative importance of side effects and treatment success associated with each assessment considered. RESULTS: Ignoring WT1, the 12-wk strategy is associated with the most expected treatment successes (471 vs 439 and 406 for 4- and 12-wk strategies, respectively). When WT1 was inversely proportionate to expected side effect burden, the 2-wk strategy produced more treatment successes (222 vs 190 and 141 for 4- and 12-wk strategies, respectively). If WT1 for the 2-wk assessment exceeded 115% of the WTI for 12-wks, the 2-wk strategy produced more treatment successes than the 4-wk strategy. CONCLUSIONS: The optimal timing of a mid-therapy assessment depends on test performance and the relative importance of side effects and treatment success to patients. Understanding patients’ treatment preferences can help decision makers design treatment guidelines that have the greatest potential to reach public health goals.

A DYNAMIC MODEL TO MAXIMIZE THE HEALTH BENEFITS IN MUTUALLY EXCLUSIVE SUSCEPTIBLE INFECTIOUS POPULATIONS

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To effectively control infectious diseases, great efforts have been made using empirical and theoretical approaches to explore the age-related characteristics of various infectious diseases, such as the force of infection (POI), the per capita rate that a susceptible from a certain age is infected. Among them, mathematical epidemiologic models have contributed greatly to the control of infection within population. With the relaxed

WILLINGNESS TO INITIATE THERAPY AND PUBLIC HEALTH POLICY: AN APPLICATION TO THE STRATEGIC DEVELOPMENT OF CLINICAL PRACTICE GUIDELINES FOR HEPATITIS C TREATMENT

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OBJECTIVES: When the course of therapy is long—particularly if treatment is expensive and/or associated with significant side effects—standards of care often include an early assessment of treatment effectiveness. If this “mid-therapy” assessment is positive, the patient is indicated to continue treatment; if negative, treatment is discontinued. Using expected utility theory, we demonstrated previously that the availability and timing of such assessments can serve as a mechanism by which policymakers can influence patients’ treatment initiation decisions. Here, we demonstrate the interaction between the timing of mid-therapy assessment, willingness to initiate (WTI) therapy, and treatment success using an application to hepatitis C virus (HCV) treatment. METHODS: A simple decision tree framework was used to compare the number of treatment successes for a hypothetical population of 1000 patients when initial mid-therapy assessments are conducted at 2-weeks (wks), 4-wks, and the current standard of care, 12-wks, with and without considerations of WTI. Test performance characteristics were based on published reports. Hypothetical treatment initiation probabilities were derived from the expected burden of side effects and the prior probability of treatment success associated with each assessment considered. RESULTS: Ignoring WTI, the 12-wk strategy is associated with the most expected treatment successes (471 vs 439 and 406 for 4- and 12-wk strategies, respectively). When WTI was inversely proportionate to expected side effect burden, the 2-wk strategy produced more treatment successes (222 vs. 190 and 141 for 4- and 12-wk strategies, respectively). If WTI for the 2-wk assessment exceeded 115% of the WTI for 12-wks, the 2-wk strategy dominated. CONCLUSIONS: The optimal timing of a mid-therapy assessment depends on test performance and the relative importance of side effects and treatment success to patients. Understanding patients’ treatment preferences can help decision makers design treatment guidelines that have the greatest potential to reach public health goals.