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Value of Information Analysis from a Societal Perspective: A Case Study in Prevention of Major Depression

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ABSTRACT

Objectives: Productivity losses usually have a considerable impact on cost-effectiveness estimates while their estimated values are often relatively uncertain. Therefore, parameters related to these indirect costs play a role in setting priorities for future research from a societal perspective. Until now, however, value of information analyses have usually applied a health care perspective for economic evaluations. Hence, the effect of productivity losses has rarely been investigated in such analyses. The aim of the current study therefore was to investigate the effects of including or excluding productivity costs in value of information analyses. **Methods:** Expected value of information analysis (EVPI) was performed in cost-effectiveness evaluation of prevention from both societal and health care perspectives, to give us the opportunity to compare different perspectives. Priorities for future research were determined by partial EVPI. The program to prevent major depression in patients with subthreshold depression was opportunistic screening followed by minimal contact psychotherapy. **Results:** The EVPI indicated that regardless of perspective, further research is potentially worthwhile. Partial EVPI results underlined the importance of productivity losses when a societal perspective was considered. Furthermore, priority setting for future research differed according to perspective. **Conclusions:** The results illustrated that advise for future research will differ for a health care versus a societal perspective and hence the value of information analysis should be adjusted to the perspective that is relevant for the decision makers involved. The outcomes underlined the need for carefully choosing the suitable perspective for the decision problem at hand.

Keywords: cost-effectiveness, perspective, productivity costs, uncertainty, value of information analysis.

Introduction

Estimates of cost-effectiveness are surrounded by uncertainty. Reduction of uncertainty is usually costly. A value of information (VOI) analysis estimates the monetary value of investments that may be required to eliminate all or part of uncertainty in the evaluations. Such estimation can support the decision maker in deciding whether further research is warranted [1]. When further research turns out to be worthwhile, more detailed VOI analysis can identify the uncertainties that should then become research priorities. VOI for parameters estimates the expected VOIs on groups of parameters and assists the decision maker to decide on those uncertainties. The concept of VOI analysis [1] was applied in many sectors [2] before it was introduced in health technology assessment by Claxton [3]. Recently, the number of applications in health care has steadily grown. A range of studies was published after 2004 [4–13].

While the societal perspective is recommended for economic evaluations in many countries [14], the majority of the previous studies have applied a health care perspective in analyzing the VOI. Studies performed in the United Kingdom were just following national directives in adopting a health care perspective according to The Guidelines Manual [15]. Also, among the non-UK studies, however, only a few have taken into account other than direct health care costs. Some included direct non–health care or some part of indirect health care costs [10,16]; however, they have ignored productivity losses. Galani et al. [17] mentioned that cost estimates included indirect costs, but they did not elaborate further on the consequences of this for the interpretation of their results. Nevertheless, most guidelines that recommend using a societal perspective also suggest comparing the results from two perspectives. Such a comparison has been usually missing from the studies. The review by Yokota and Thompson [2] highlights that in other sectors

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also applications have often chosen a relatively narrow perspective. Hence, to the best of our knowledge, only very few articles have included productivity losses and if they did, the implications were not thoroughly discussed. This seems an omission because in interventions that target chronic diseases with a high prevalence among patients in their working ages, productivity costs may have a large impact on cost-effectiveness results. Furthermore, productivity costs often can be estimated only with large uncertainty. Information on individuals' working hours as well as hourly productivity may be difficult to ascertain and is not often included in most clinical trials. Therefore, looking at the impact of the choice of perspective and inclusion of productivity costs on the outcomes of a VOI analysis is worthwhile and was the aim of the current study.

A case study was chosen in the field of mental disorders. Many reports show that mental disorders lead to a reduction in employee productivity due to absenteeism or impaired functioning at work [18]. Depression is one of the major mental disorders with a high burden of disease [19,20]. Because of work loss, absenteeism, and presentism, productivity losses resulting from depression are considerable [21]. A recent study showed that productivity costs, on average, reflect more than half of the total costs for the treatment of depressive disorders [22]. In fact, the majority of costs of depression fall outside the health care sector; that is, the benefits of preventing depression are not restricted to the health sector but society as a whole. Accordingly, for many health care decision makers it will be relevant to consider a societal perspective in addition to the health care perspective in evaluating cost-effectiveness in depression prevention. Still, to date, most economic evaluations of treatments for adults with depressive disorders have ignored productivity losses [22].

The objective of our study then was to perform a VOI analysis in cost-effectiveness evaluation of preventing major depression (MD) in patients with minor depression. We considered both a societal and a health care perspective and paid attention to the consequences of different perspectives for policy advice. The depression case serves as an illustration for many interventions with large but uncertain effects on productivity costs.

Materials and Methods

In a recent study [23], a Markov model based on Vos et al. [24] was used to evaluate the costs and long-term health benefits of screening followed by minimal contact psychotherapy (MCP) for depression prevention. The model was adjusted to allow evaluation of depression prevention and was adapted to the Dutch setting. The short-term outcomes of MCP were previously evaluated alongside a randomized controlled trial [21]. The current article adds an elaborate VOI analysis and focuses on a comparison between the values of solving uncertainties for different perspectives. The model was used to extrapolate the trial outcomes over a 5-year time horizon. Five years were considered long enough to capture the full effects of the intervention and still short enough to trust the data on the population and the screening results. The discount rates used were 1.5% and 4% according to the Dutch Guidelines for pharmacoeconomic research [25], and monetary outcomes were valued in euros, at the 2008 price level. For clarity reasons, we explain the intervention, the model, and parameter estimation sources in the following sections.

Intervention

The intervention was opportunistic screening for subthreshold depression followed by MCP. Full details about the intervention and its short-term effects compared with no screening have been published before [26]. In short, opportunistic screening takes place in three steps: first, people are approached by the assistant when they are in the waiting room during a regular general practitioner visit. Those who are eligible for screening and give informed consent (participation rate 72.5%) are then screened for subthreshold depression (screen positive rate 26.6%). In a second step, screen-positive patients are approached for a further screening to check whether they meet the inclusion criteria for subthreshold depression (participation rate 35.7%). Those who meet all inclusion criteria receive MCP (59.5% of positive screens).

MCP consists of a self-help manual with instructions on cognitive-behavioral self-help in mood management skills. The manual contains registration exercises and homework assignments aimed at cognitive restructuring, relaxation, and activity scheduling to increase pleasant activities.

In the control group, no screening took place. People with subthreshold depression received care as usual from their general practitioner; that is, they were offered treatment on presenting themselves with symptoms.

The effects of the intervention were twofold: incidence and recurrence of MD decreased by 6% [26] and the total annual per-capita costs decreased by 21% [21].

Patient Population

The intervention targets patients with minor (subthreshold) depression. Subthreshold depression, which is diagnosed when a patient has two to four symptoms of MD, has a lifetime prevalence of 10% [27]. People with minor depression have an increased risk of developing MD compared with those not meeting the criteria of subthreshold depression [28].

Markov Model

The model distinguishes three main states: subthreshold depression, MD, and recovered from depression (no MD). Each state is divided into episodes that last for 4 weeks. After each cycle of 4 weeks, a person has the chance of moving to another state of disease, or to stay in the same state and start a new episode within that state. The Markov model is depicted in Figure 1.

The probability of developing MD for people with subthreshold depression (the incidence rate) has been assumed to be independent of the time that persons were in the subthreshold state, while the probabilities of recovery from MD and relapse into MD by assumption decreased over the time that was spent in MD and no-MD states, respectively. Parameters related to costs and quality-adjusted life-years (QALYs) in the recovered states are by assumption the same as in the subthreshold states.

Modeling and analyses were all done by means of the R software environment for statistical computing.

Parameter Estimation

Estimates of relapse and recovery rate as a function of duration were based on the Dutch NEMESIS study [19], a large population-based cohort study addressing mental disorders. The time-dependent probability curves for relapse and recovery rates can be found in van den Berg et al. [23]. Prevalence of subthreshold depression, intervention costs, and health care and societal costs for subthreshold depression were based on trial results [21]. Population parameters and incidence probabilities from subthreshold depression to MD were taken from Willemse et al. [26]. Costs and productivity losses for MD were estimated on the basis of a review of Dutch studies [29–31]. QALY estimates were based on the NEMESIS study [19]. Distribution functions were estimated for all important model parameters. Parameters that were used in the probabilistic sensitivity analysis are presented in Table 1.

Effects of MCP were conservatively assumed to cease 1 year after the intervention. That is, after 1 year, persons are assumed to return to the same risk of developing MD as under care as usual if still in the subthreshold state.