

## Economic evaluation of interventions for occupational health: exploring methods & applied studies

The aim of occupational health is to keep workers healthy and productive. Resources to address worker health issues are limited; therefore, occupational health professionals and other decision-makers (e.g. company managers) have to make choices between treatment options. To make choices between various options, information is needed not only about the effectiveness of a particular treatment, but also whether it is cost-effective. That is, is a given treatment “good value for money?” An answer can be given by an economic evaluation, which involves a systematic comparison of both the costs and effects of two or more treatment options.

The first step in an economic evaluation involves selecting the perspective from which the evaluation will be conducted. Traditionally, a societal perspective is used, in which all costs and effects are taken into account, regardless of who pays and who gains. It is also possible to conduct the evaluation from a specific stakeholder perspective (for example, a company, worker or insurer) in which a more selective range of costs and effects are included. The advantage is that the results are more readily interpretable for the given stakeholder. In Dutch occupational health care, a company is a key stakeholder. However, conducting economic evaluations from a company’s perspective is relatively new and the need to develop specific methodology is recognized as a priority.

In this dissertation, we focused on two aspects of economic evaluations pertaining to occupational health interventions. First, we explored how the methodology of economic evaluations from a company’s perspective could be improved (chapters 2, 3, and 4). Second, we aimed to generate new evidence of the cost-effectiveness of three different occupational health interventions (chapters 5, 6, and 7).

In **chapter 2**, we presented the results of a systematic review of the methodological quality of economic evaluations conducted from a company’s perspective. To find relevant studies, we searched through five literature databases (i.e. Medline, Embase, the Cochrane NHS Economic Evaluation Database, the National Institute for Occupational Safety and Health database, the Ryerson International Labour, Occupational Safety and Health Index database), scanned reference lists, and searched through our own literature database. Methodological quality was appraised, independently by two reviewers, using the Consensus Health Economic Criteria list (CHEC-list), a 19-item assessment tool. In general, the overall methodological quality of the economic evaluations from a company’s perspective was poor. Of the 34 included articles, only 44% met more than 50% of the CHEC-list quality criteria. Eight of the 19 quality criteria were met by 50% or more of the studies. Quality criteria that were least fulfilled included those related to the measurement of outcomes, measurement of costs and valuation of costs, sensitivity analysis, essential aspects of an economic evaluation. We provided suggestions for improving the methodological quality of economic evaluations from a company’s perspective.

In **chapter 3**, we reviewed how health-related changes in productivity were measured and valued in economic evaluations from a company’s perspective. We used the same set of 34 articles as in the systematic review presented in chapter 2. From these 34 studies, we extracted data on the methods used to measure and value health-related productivity

changes. We found that methods for measuring and valuing changes in health-related productivity varied widely between studies: changes in health-related productivity were estimated using (a combination of) data related to sick leave, compensated sick leave, light or modified duty or work presenteeism; data were collected from different sources (e.g. administrative databases, worker self-report, supervisors) and by different methods (e.g. (non-)standardized questionnaires, interviews); and valuation varied in terms of reported time units, composition and source of the corresponding price weights, and whether additional elements such as replacement costs were included. Such variation can hinder comparability between studies. We provided suggestions for improvement.

**Chapter 4** describes the results of a modified Delphi study. The objectives were to identify, via consensus, a key set of items for estimating the cost of health-related productivity loss from a company's perspective; and to develop recommendations for estimating this cost based on the consensus findings. A predetermined set of 26 items formed the basis for inquiry, and we sought opinions regarding an item's relevance and retrieveability of data. We collected opinions separately for the case of productivity loss due to work presenteeism, short-term absenteeism (<2 weeks) and long-term absenteeism (> 2 weeks). The panel consisted of 36 Dutch experts from five stakeholder groups (employers, employees, policy makers/insurers, occupational health professionals, and researchers). After two rounds, 4 items were found relevant for estimating the cost of health-related productivity loss due to work presenteeism, 6 items for short-term absenteeism, and 11 items for long-term absenteeism. The retrievability of data was variable. Based on the findings, we formulated three sets of recommendations for estimating the cost of health-related productivity loss from the company's perspective.

Non-specific low back pain (LBP) is a common condition that can result in extended periods of work absenteeism and health care use. Literature suggests that initiation of return-to-work activities in the subacute phase of low back pain may be promising. In **chapter 5**, we presented the results of an economic evaluation conducted alongside a randomized controlled trial involving sick-listed airline workers with subacute, non-specific low back pain. The objective was to compare the costs and benefits from a company's perspective of a graded activity intervention to usual care for this worker population. A total of 134 predominantly blue collar workers participated; of these, 67 were randomized each to the graded activity and usual care groups. We collected data on health care resource use by means of cost diaries, and we obtained data on sick leave from the electronic database of the occupational health services department. At the end of the first follow-up year, mean investment costs for the graded activity intervention were €475 per worker. When we compared the total health care costs between the two groups, the costs were €83 higher in the graded activity group compared to the usual care group. The extra costs associated with the graded activity group were offset by mean savings of €999 (95% CI: -1073; 3115) due to a reduction in productivity loss. The potential cumulative savings were an average of €1661 (95% CI: -4154; 6913) per worker over a 3-year follow-up period. From a company's perspective, the graded activity intervention for subacute, non-specific LBP may be a cost-beneficial return-to-work intervention.

Stress-related mental health problems are a growing concern among the working population. Treatment is often sought in primary care. In **chapter 6**, we investigated whether a general practitioner-based minimal intervention for workers with stress-related sick leave (MISS) was cost-effective compared to usual care (UC). We conducted an economic evaluation from a societal perspective alongside a randomized controlled

trial. The randomization took place at the level of the general practitioner. Forty-six general practitioners (GPs) and 433 patients participated: 24 GPs and 227 patients in the MISS group and 22 GPs and 206 patients in the usual care group. We collected cost and effect data using a combination of questionnaires, interviews and computerized medical records. No statistically significant differences in costs or quality-adjusted life years (QALYs) were observed. The results indicated that the minimal intervention was slightly more effective and less costly than usual care (i.e. the mean incremental cost per QALY was –€7356 and located in the southeast quadrant of the cost-effectiveness plane). Depending on the amount that society would be willing-to-pay to gain an additional QALY – say given a range from €0 to €100,000 – the probability that the MISS was cost-effective compared to usual care increased from 58% to 90%. At a willingness-to-pay level of €25,600 for an extra QALY, the probability was 80%. We also conducted analyses of preplanned subgroups of patients. The results pertaining to the subgroup diagnosed with stress-related mental disorders indicated that the MISS intervention was more effective and less costly (i.e. mean incremental cost per QALY was –€28,278, and located in the southeast quadrant of the cost-effectiveness plane). For this subgroup, the probability of the MISS being cost-effective compared to usual was 92% from a willingness-to-pay level of €0. Based on the findings, we concluded that the minimal intervention was not cost-effective compared to usual care for a heterogeneous patient population. Therefore, we do not recommend widespread implementation. The intervention, however, may be cost-effective for the subgroup stress-related mental disorders. This finding should be confirmed before implementation for this subgroup is considered.

Working women can experience a myriad of physical and mental health problems following childbirth, and sick leave is relatively common. The existence of work presenteeism is plausible, however, the extent of the problem is unclear. There is little known about cost-effective ways to intervene. **Chapter 7** describes findings from the Mom-at-work study, in which we evaluated whether supervisor case management (SCM) during maternity leave is cost-effective from a societal perspective in reducing sick leave and improving quality-adjusted life years (QALYs) compared to common practice (CP). We conducted an economic evaluation alongside a randomized controlled trial, in which 541 working women from 15 companies participated. Cost and effect data were collected by questionnaires. No statistically significant between-group differences in QALYs, mean hours of sick leave or work presenteeism, or costs were observed. In terms of cost-effectiveness, the results indicated that SCM was less effective and more costly than CP. The probability that SCM was cost-effective compared to CP remained relatively constant at 20%, regardless of increasing levels of willingness-to-pay for each additional QALY from €0 through €50,000. Overall resource use during the first year post-partum was low. Mean total costs were €3678 (95% CI: 3386; 3951). Over a third (37%) of the total costs were related to costs of health-related productivity loss, which in turn, were attributable to sick leave (48%) and work presenteeism (52%). The results indicated that SCM was not cost-effective compared to common practice for a healthy population of working mothers. Therefore, implementation is not warranted. A post-hoc cost analysis from a company's perspective was also inline with this conclusion. The cost-effectiveness of SCM for working mothers with more severe post-partum health problems needs to be investigated. Also, work-presenteeism accounted for half of the total health-related productivity loss and warrants attention in future studies.

Finally, in **chapter 8**, we presented a discussion of the main findings of this

dissertation, methodological considerations, and recommendations for occupational health practice and research. The findings from these applied studies indicated that widespread implementation of the GP-based minimal intervention for workers with stress-related sick leave and the supervisor case management for working mothers following childbirth is not warranted. Implementation of the graded activity, however, may be. A number of occupational health interventions exist, which have not yet been evaluated for effectiveness and cost-effectiveness, or which persist in use even after health claims have been shown to be unfounded. In occupational health practice, evidence should precede implementation because otherwise already scarce resources will become more scarce, and it is always more difficult to remove something once it has been introduced.

Conducting economic evaluations of interventions for occupational health is a complex endeavour. It is an interdisciplinary research field and there are multiple stakeholders. Research, whether methodological or applied, should be in collaboration. Future initiatives to improve methodology should include efforts to clarify methods, terminology and concepts, and establish best practice guidelines. These guidelines should provide explicit recommendations for reporting key aspects of methodology underlying the measurement and valuation of changes in health-related productivity loss. Improvements in reporting will positively affect transparency and will simplify the process of determining whether studies are comparable. In addition, it will facilitate the process of judging the extent to which the results of a given study are transferable to another socio-political context.

Recent developments – publication of a field-specific textbook in 2008 and EU-financed workshops – demonstrate how economic evaluations of occupational health and safety are a research priority not only in The Netherlands, but internationally. Aims of the workshops include reaching consensus on optimal methods of economic evaluation in occupational safety and health. Therefore...stay tuned for the developing story.

