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Consensus-based findings and recommendations for estimating the costs of health-related productivity loss from a company's perspective

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Abstract

Objectives

There were two study objectives: (i) to identify, via consensus, a key set of items for estimating the costs of health-related productivity loss from a company's perspective and (ii) to develop recommendations for estimating the costs of productivity loss on the basis of consensus findings.

Methods

A modified Delphi procedure was utilized in which a predetermined set of 26 items formed the basis for inquiry in the first round. Thirty-six experts from five stakeholder groups in The Netherlands (employers, employees, policy makers/insurers, occupational health professionals, and researchers) participated in the panel. Opinions were sought regarding an item's relevance and retrievability of data for three forms of work loss: work presenteeism (i.e. decreased work performance while at work), short-term absenteeism (< 2 weeks), and long-term absenteeism (> 2 weeks). Data were analyzed quantitatively and qualitatively. Consensus for relevance was set at 70%.

Results

After two rounds, 4 items were found relevant for estimating the costs of 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. Three sets of recommendations were formulated for estimating the costs of productivity loss from the company's perspective.

Conclusion

A streamlined set of relevant items has been identified via consensus and formulated into recommendations for estimating the costs of health-related productivity loss from a company's perspective. Although not definitive, these recommendations represent an important step toward standardizing the way these costs are estimated, and in turn, facilitate comparability and utility of economic evaluations of occupational health interventions.

Research on health outcomes aims at evaluating treatment efficiency and at generating information to support rational decision making with regards to the allocation of finite resources¹. A specific form of inquiry is the economic evaluation, and while the societal perspective is traditionally recommended as the framework for such evaluations, the use of a more specific stakeholder perspective may be warranted²⁻⁵.

The socio-economic impact of health-related work incapacity for companies may be significant. In The Netherlands, for instance, companies are obligated to continue to pay 70-100% of the salary of ill employees during the first two years of illness, regardless of work-relatedness. Literature demonstrating the relationship between health and work productivity and resultant financial burden of illness is also increasing⁶⁻¹³. As companies become more aware of the need to pay attention to the health of their employees and look to implement occupational health interventions in the workplace setting, tailored evidence is required for informative health-investment decision making by a company^{2 3 5 14 15}.

In economic evaluations conducted from a company's perspective, the benefit of occupational health (OH) interventions is commonly expressed in terms of changes (or differences) in productivity loss that can be translated into a monetary value¹⁶. However, objective data on productivity are often lacking, and estimates of the costs of productivity loss are often based on the number of sick leave days¹⁷. In the literature, the need to consider work presenteeism (i.e. decreased work performance while on the job) as a component of the costs incurred from productivity loss is increasingly being recognized^{8 13 18}, and a number of questionnaires have been developed to measure this phenomenon¹⁹⁻²². Furthermore, other elements have been suggested such as costs related to hiring and training replacements, spill-over effects to co-workers, and mechanisms that may reduce or increase overall productivity loss^{2 23-26}. However, it is not clear as to whether all suggested elements are equally relevant from a company's perspective.

Thus, this study has two objectives, to identify, via consensus among stakeholders in The Netherlands, a key set of items for estimating the costs of productivity loss from a company's perspective and to develop recommendations for items to be included in the estimation on the basis of the consensus findings.

Methods

Study design

To meet our objectives, we used a modified Delphi procedure. This method was selected as it lends itself to the formation of a collective opinion on a topic spanning a wide range of stakeholders²⁷. To improve the practical applicability of the research findings, the consensus procedure involved representatives from key stakeholder groups in occupational health^{4 28}.

To improve the efficiency of the study procedure, the first round was modified from being predominantly qualitative to quantitative, in which a predetermined set of items was presented to the expert panel for rating^{14 27 29}. The items were identified from published literature, existing guidelines, and productivity measurement tools, as well as from 10 exploratory interviews with human resource personnel, financial advisors and occupational physicians employed at various sized companies. A concept of the first round questionnaire was piloted ($N = 4$) before the official commencement of the study.

Panel participants

Using a combination of convenience and purposive sampling, experts from five stakeholder groups in the Netherlands (employers, employees, policy makers/insurers, OH professionals, and researchers) were invited to participate in the panel²⁷³⁰. Experts were defined as individuals who had a minimum of 3 years experience in OH, absenteeism and/or work productivity related issues. Fifty potential panel members were approached during a 2-month recruitment period (June-August 2005), of whom 36 indicated having sufficient expertise and time to participate. These experts were employed in various sized companies located in sectors such as industry, construction, finance, transportation and communication, commercial services, public governance, and health care. The “employer” group (28% of the panel) included department heads, human resource managers, financial managers, or entrepreneurs. “Employees” (11%) were union representatives or chairpersons of Safety, Health, Wellness & Environment Committees of their respective places of employment. Members of the “policy maker/insurer” group (17%) often held multiple job roles and had experience in areas such as return-to-work and work disability. The “occupational health professional” group (25%) included OH physicians and nurses, physical therapists, and ergonomists. In addition to clinical work, some performed management or consultation tasks. “Researchers” (19%) were active in areas of study such as health economics, ergonomics, occupational health, and work- and organizational psychology. Collectively, 75% of the members had more than 10 years of relevant experience.

Data collection

The definitive version of the first round questionnaire was based upon 26 items, which have been arbitrarily grouped into four categories and coded to facilitate reporting (table 1). Of these, 22 items reflected productivity consequences that may arise from health-related reductions in employee production (work) capacity, and four items (W3, CW5, C12, C13) reflected mechanisms by which negative productivity consequences may be buffered or “compensated”. The term “compensation mechanisms” is used to refer to these four latter items in the remainder of this paper.

A priori, we expected that the relevance and retrievability of data for certain items would differ depending on the type of work loss at hand. Thus, the experts’ opinions were sought regarding each item’s relevance and retrievability of data for three forms of work loss: (i) work presenteeism, (ii) short-term absenteeism (< 2 weeks), and (iii) long-term absenteeism (> 2 weeks).

In round 1, for each form of work loss, the panel members were asked to rate how relevant they thought a particular productivity consequence was for estimating the costs of productivity loss from a company’s perspective, using a 6-point Likert scale anchored by 0 (“completely irrelevant”) and 5 (“definitely relevant”). Concurrently, they were asked to rate the ease with which data on these consequences could be retrieved on a 4-point Likert scale (0 = impossible or only with undue effort; 1 = within a week; 2 = within a day; or 3 = with a click of the mouse). Next, panel members were asked to indicate whether or not a given compensation mechanism may significantly lessen health-related productivity loss and therefore be included when the costs of productivity loss are estimated. Last, because ratings could be influenced by the type of worker that the panel members had in mind while completing the questionnaire, additional questions were asked to gain insight into these “representative functions”. These questions

addressed, for example, the ease with which a perfect substitute could be found, the time sensitive nature of the work tasks, and the degree of teamwork³¹. Space was provided for explanations, suggestions for additional items and general feedback.

Table 1. Categorized and coded list of the 26 items presented to the panel in Round 1.

Category	Code	Items
Worker	W1A	Duration of the period of work presenteeism (reduction in work performance)
	W2A	Degree of work presenteeism
	W1B	Duration of the short-term absenteeism period
	W2B	Degree of absenteeism per day during the given period of short-term absenteeism
	W1C	Duration of the long-term absenteeism period
	W2C	Degree of absenteeism per day during the given period of long-term absenteeism
	W3	Worker catches up on tasks after recovery from illness
Co-workers	CW1	Amount of time during normal working hours that co-workers provide coverage at the expense of less urgent activities such as innovation (loss of innovative capacity)
	CW2	Amount of overtime hours during which co-workers take over work for the ill worker
	CW3	Increased workload or pressure
	CW4	Decreased productivity of co-workers who are dependent on the ill employee
	CW5	Work taken over by co-workers (from the ill, less effective worker) during normal work hours (as a buffer)
Administrative	A1	Time to arrange temporary coverage via internal help
	A2	Time to arrange temporary coverage via external help
	A3	Time to recruit and hire a permanent replacement
	A4	Time to orient and train the (permanent) replacement
	A5	Time spent facilitating the return-to-work of ill/injured worker
Company	C1	Loss in the form of missed orders & sales, lost deals & contracts
	C2	Decrease in efficiency of replacement worker during the training/orientation phase
	C3	Costs due to decreased quality of product/service (e.g. returns, rejections, claims under warranty)
	C4	Idle assets such as unused workspace, material, inventory (overhead)
	C5	Salary of the replacement worker
	C6	Cost of light duties for the worker on a RTW pathway
	C7	Change in attractiveness of company as potential employer under potential recruits
	C8	Change in employee satisfaction
	C9	Time & money spent to evaluate workplace and/or implement ergonomic interventions
	C10	Legal costs
	C11	Fines or increases in insurance premiums
	C12	Superfluous nature of the function within the company
	C13	Reimbursement of sick leave costs via insurance

In round 2, a summary of the first-round findings were reported back to the panel members. Using the same scales as in round 1, the panel members were asked to re-rate the relevance of a reduced set of items. For each repeated item, five sources of feedback were provided: a histogram of the first-round ratings, the percentage of panel members who rated the item as relevant, the mean and standard deviation of the rating, the associated comments, and their respective first round opinion. Again, space was provided for comments.

Data analysis

In order to determine consensus, data from both rounds were analyzed both quantitatively and qualitatively. First, the opinions of the panel members were analyzed by the following three steps: (i) inspection of response distributions of each panel member per stakeholder group, as well as across groups, (ii) inspection of response distributions per item for bimodality, and (iii) calculation and (visual) determination of the (change in) collective opinion regarding an item's relevance and retrievability in terms of (the change in) frequencies, means and standard deviations^{32 33}. To determine the relevance-related frequencies, we regrouped responses for the 22 items reflecting productivity consequences as "not relevant" (ratings of 0-2) and "relevant" (ratings of 3-5). With respect to retrievability of data, the frequencies for each rating were determined. For the four items concerning the compensation mechanism, an opinion that an item should be included was interpreted as "relevant" and that of not included as "not relevant". Second, the comments accompanying panel member ratings were analyzed qualitatively by applying coding techniques (open, axial and selective coding) originating from grounded theory³⁴.

The following four "rules" were then followed to identify consensus and determine the item set for round 2: (i) if less than 50% of the panel members rated the item as relevant, then the item was excluded from further consideration, (ii) if 70% or more of the panel members rated an item to be relevant, then there was consensus that the item was relevant and should be included in the recommendations, (iii) if 50-69% of the panel members considered the item to be relevant, then the item was eligible for Round 2, and (iv) for all irrelevant and borderline items (50-55% and 67-69%), the associated comments were closely reviewed to see if an exception to rules 1 or 3 should be made.

Results

Number of Delphi rounds and response rate

Altogether, two written rounds were required to meet the objectives of the study. The response rate from round 1 to round 2 was 86% (31 of 36). In round 2, 100% of the employees (4 of 4) and researchers (7 of 7) responded. The response rate of the second round was 70% (7 of 10), 83% (5 of 6) and 89% (8 of 9) for the employers, policy makers/insurers, and occupational health professionals, respectively. Two non-respondents changed jobs and one was hindered by extenuating circumstances at work. The reasons for the remaining non-respondents are unknown. The collective experience of the responders remained high in round 2 (i.e. 80% had more than 10 years experience).

Pattern of responses

Across both rounds, the opinions varied not only between members of the same

stakeholder group, but also across all of the groups. Similarly, the representative functions varied within and across the groups. On average, the representative function was characterized as follows: a perfect substitute was more or less easy to find, work tasks were somewhat difficult to postpone, and work was performed more or less in a team situation. There were no cases where extreme ratings were given for all three characteristics, nor was a consistent pattern detected between the characteristics of the representative function and relevance ratings.

Relevance

The relevance findings from rounds 1 and 2 for work presenteeism, short-term absenteeism, and long-term absenteeism are presented in tables 2, 3, and 4, respectively. All in all, four items were found to be relevant for estimating the costs of productivity loss due to work presenteeism, six were determined for short-term absenteeism, and there were 11 for long-term absenteeism.

Table 2. Consensus findings for estimating the costs of lost productivity due to work presenteeism, reported in terms of the percentage of panel members (PM) rating a given item as “relevant” (score of 3-5) and the respective means and standard deviations (SD).

Code	Items	Round 1			Round 2		
		PM (%)	Mean	SD	PM (%)	Mean	SD
W1A	Duration of the presenteeism period	83 ^a	3.56	1.32	..	..	..
W2A	Degree of decreased work performance	83 ^a	3.66	1.30	..	..	..
W3	Worker catches up on tasks after recovery	53 ^b	..	..	..	..	..
CW1	Coverage by co-workers during normal working hours at the expense of less urgent activities	58 ^b	2.83	1.34	..	..	..
CW2	Amount of overtime hours by co-workers	85 ^a	3.82	1.24	..	..	..
CW3	Increased workload/pressure for co-workers	43 ^c	2.31	1.45	..	..	..
CW4	Decreased productivity of co-workers who are dependent on the less effective worker	64 ^d	2.67	1.39	55 ^e	2.45	1.21
CW5	Work taken over by co-workers during normal working time (as a buffer)	72 ^a	..	..	..	..	..
C1	Loss in the form of missed orders, sales, lost deals & contracts	56 ^d	2.78	1.69	45 ^e	2.41	1.43
C3	Costs due to decreased quality of product/service	67 ^d	2.97	1.65	47 ^e	2.60	1.43
C7	Change in the attractiveness of the company under potential recruits	29 ^c	1.66	1.66	..	..	..
C8	Change in employee satisfaction	46 ^c	2.39	1.73	..	..	..
C9	Time & money spent to evaluate the workplace and/or implement ergonomic modifications	50 ^b	2.64	1.79	..	..	..
C10	Legal costs	40 ^c	2.17	1.81	..	..	..
C12	Superfluous nature of the function	22 ^c	..	..	..	..	..
C13	Reimbursement of sick leave costs from insurance	36 ^c	..	..	..	..	..

^a Consensus reached (70% or greater, or insight from comments) and included in recommendations; ^b Borderline item with reason for exclusion: W3 – limited applicability; CW1 – overlap with another item; C9 – item considered a normal obligation; ^c Item excluded from further consideration on basis of identification as “not relevant” & insights from comments; ^d Item taken to the Round 2 for re-voting; ^e Item identified as “not relevant” and/or collective opinion stable across rounds.

Table 3. Consensus findings for estimating the costs of lost productivity due to short-term absenteeism (< 2 weeks) reported in terms of the percentage of panel members (PM) rating a given item as “relevant” (score of 3-5) and the respective means and standard deviations (SD).

Code	Items	Round 1			Round 2		
		PM (%)	Mean	SD	PM (%)	Mean	SD
W1B	Duration of short-term absenteeism period	91 ^a	4.29	0.94	..	..
W2B	Degree absenteeism per day per period	78 ^a	3.92	1.34	..	..
W3	Worker catches up on tasks after recovery	56 ^b	..		58 ^c	..	
CW1	Coverage by co-workers during normal working hours at the expense of less urgent activities	70 ^a	3.06	1.22	..	..
CW2	Amount of overtime hours by co-workers	89 ^a	4.03	1.04	..	..
CW3	Increased workload/pressure for co-workers	44 ^d	2.50	1.28	..	..
CW4	Decreased productivity of co-workers who are dependent on the ill employee	58 ^b	2.69	1.28	55 ^c	2.58	1.18
CW5	Work taken over by co-workers during normal work hours (as a buffer)	72 ^a	..		..	..
A1	Time to arrange temporary internal help	49 ^d	2.37	1.31	..	..
A2	Time to arrange temporary external help	46 ^d	2.34	1.49	..	..
C1	Loss in the form of missed orders & sales, lost deals & contracts	50 ^e	2.92	1.50	..	..
C2	Decrease in efficiency of replacement worker during the training/orientation phase	56 ^b	2.53	1.28	55 ^c	2.58	1.12
C3	Costs due to decreased quality of product/service	58 ^b	2.86	1.53	58 ^c	2.77	1.33
C4	Idle assets (overhead)	15 ^d	1.33	1.05	..	..
C5	Salary of the replacement worker	72 ^a	3.42	1.54	..	..
C7	Change in attractiveness of company as an employer under potential recruits	36 ^d	1.92	1.57	..	..
C8	Change in employee satisfaction	49 ^d	2.33	1.78	..	..
C9	Time & money spent to evaluate the workplace and/or implement ergonomic modifications	44 ^d	2.44	1.75	..	..
C10	Legal costs	29 ^d	1.89	1.76	..	..
C12	Superfluous nature of the function	33 ^d	..		..	..
C13	Reimbursement of sick leave costs via insurance	33 ^d	..		..	..

^a Consensus reached (70% or greater, or insight from comments) and included in recommendations; ^b Item taken to the round 2 for re-voting; ^c Item identified as “not relevant” or collective opinion stable across the rounds; ^d Item excluded from further consideration on basis of identification as “not relevant” and insights from comments; ^e Borderline item with reason for exclusion: C1 – limited applicability.

Table 4. Consensus findings for estimating the costs of lost productivity due to long-term absenteeism (> 2 weeks) reported in terms of the percentage of panel members (PM) rating a given item as “relevant” (score of 3-5) and the respective means and standard deviations (SD).

Code	Items	Round 1			Round 2		
		PM (%)	Mean	SD	PM (%)	Mean	SD
W1C	Duration of long-term absenteeism period	97 ^a	4.53	0.74	..	..
W2C	Degree of absenteeism per day per period	94 ^a	4.36	0.87	..	..
W3	Worker catches up on tasks after recovery	22 ^b	..		..	..
CW1	Coverage by co-workers during normal working hours at the expense of less urgent activities	78 ^a	3.42	1.18	..	..
CW2	Amount of overtime hours by co-workers	94 ^a	4.31	1.02	..	..
CW3	Increased workload/pressure for co-workers	64 ^c	3.00	1.35	80 ^a	3.20	1.27
CW4	Decreased productivity of co-workers who are dependent on the ill employee	74 ^a	3.20	1.30	..	..
CW5	Work taken over by co-workers during normal work hours (as a buffer)	56 ^c	..		65 ^d	..	
A1	Time to arrange temporary internal help	50 ^e	2.65	1.41	..	..
A2	Time to arrange temporary external help	59 ^c	2.79	1.55	55 ^d	2.65	1.45
A3	Time to recruit and hire a permanent replacement	53 ^e	2.64	1.53	..	..
A4	Time to orient and train a replacement	67 ^c	3.03	1.46	65 ^d	3.00	1.24
A5	Time spent facilitating RTW of ill/injured worker	72 ^a	3.31	1.45	..	..
C1	Loss as in missed orders & sales, lost deals & contracts	63 ^c	3.14	1.54	68 ^d	3.13	1.18
C2	Decrease in efficiency of replacement worker during the training/orientation phase	67 ^c	2.83	1.13	70 ^a	2.77	0.86
C3	Costs due to decreased quality of product/service	67 ^c	3.31	1.49	65 ^d	3.19	1.40
C4	Idle assets (overhead)	32 ^b	2.03	1.29	..	..
C5	Salary of the replacement worker	81 ^a	3.83	1.52	..	..
C6	Cost of light duties as part of a RTW pathway	64 ^c	3.08	1.50	71 ^a	3.10	1.27
C7	Change in attractiveness of company as employer under potential recruits	46 ^b	2.17	1.60	..	..
C8	Change in employee satisfaction	55 ^e	2.48	1.72	..	..
C9	Time & money spent to evaluate the workplace and/or implement ergonomic modifications	60 ^c	3.09	1.74	60 ^d	3.10	1.60
C10	Legal costs	49 ^b	2.66	1.75	..	..
C11	Fines or increases in insurance premiums	63 ^c	3.11	1.91	63 ^d	3.37	1.66
C12	Superfluous nature of the function	17 ^b	..	..	..	..
C13	Reimbursement of sick leave costs via insurance	58 ^c	..	..	71 ^a	..	

^a Consensus reached (70% or greater or insight from comments) and included in recommendations; ^b Item excluded from further consideration on basis of identification as “not relevant” and insights from comments; ^c Item taken to the round 2 for re-voting; ^d Item identified as “not relevant” or collective opinion stable across rounds; ^e Borderline item with reason for exclusion: A1, C8 – related to core management tasks; A3 – illogical nature.

Retrievability of data

With the exception of the worker-level work loss consequences, there was no difference in the pattern of retrievability ratings between the three forms of work loss. Whereas more than 50% of the panel indicated that data on the duration and degree of short- and long-term absenteeism could be retrieved within a day or sooner, more than 60% indicated that retrieving such data for presenteeism was impossible or require undue effort. Most of the panel was of the opinion that data on the salary costs of replacements were also retrieveable within a day or sooner, and that data for the following five consequences could be retrieved within a week or sooner: amount of co-worker overtime (CW2), time spent to facilitate the return-to-work process of the ill employee (A5); cost of light duties (C6), time and money spent to evaluate the workplace and/or implement ergonomic interventions (C9), and legal costs (C10). More than 50% of the panel considered retrieving data on the remaining consequences to be impossible or require undue effort.

Themes emerging from the panel's comments

The following four themes were identified from the panel's comments: (i) impact and directness, (ii) context-specificity, (iii) quality management, and (iv) constraints in measurement. *Impact and directness* addressed the extent to which a given consequence could be a cost driver, or the directness of the relationship of the consequence to the decreased production capacity of the ill worker. Such comments were found by worker-level and company-level productivity consequences.

Context-specificity encapsulated comments such as "...less of an effect for short-term absenteeism", "in the construction sector...", and "dependent on the type of function...". These were often paired with items at the co-worker and company levels. Under *Quality management*, comments indicated that many co-worker and company-level items should not be attributed to a worker's health-related reduction in production capacity but to poor managerial and organizational practices, and that administrative consequences are simply "part of the job". Comments from these two themes were often repeated in round 2.

Constraints in measurement embodied challenges to measuring and registering data in practice. Identified obstacles included the intangibility of certain items, the inability to measure the item at the worker level, and limitations in registration (systems). For related items that could be measured, the validity of utilized methods was questioned: "Documenting time is a creative activity. Every worker has a vested interest in documenting sufficient time."

Recommendations

Based on a synthesis of the consensus findings and analysis of the comments, three sets of recommendations for estimating the costs of productivity loss from a company's perspective were formulated (table 5). The recommendations consisted of core and optional elements. The core elements were common across the three types of work loss whereas the optional elements could differ. The items concerning optional elements have been identified by consensus as being relevant; however, their inclusion may depend upon the circumstances, for example, their applicability to a given function or workplace and the extent to which they are cost drivers.

Table 5. Recommendations for the estimation of productivity loss costs from a company’s perspective for work presenteeism, short-term absenteeism (< 2 weeks), and long-term absenteeism (> 2 weeks).

Recommendations for work presenteeism	
Core	1. Multiply the duration (days or hours) by the degree (% decrease) of decreased work performance to determine the volume of work loss. Then multiply this volume by an average or function-specific (daily or hourly) salary.
Optional	1. Add the costs related to co-worker overtime (CW2), if paid out. 2. Subtract the amount of normal working hours that direct co-workers take over work from their less effective colleague as a buffer (CW5).
Recommendations for short term absenteeism (< 2 weeks)	
Core	1. Multiply the duration (days or hours) by the degree (% decrease) of decreased work performance to determine the volume of work loss. Then multiply this volume by an average or function-specific (daily or hourly) salary.
Optional	1. Add the costs related to co-worker overtime (CW2), if paid out. 2. Add the salary costs of the replacement worker (C5), but only the differential. 3. Select one of the two scenarios related to the effect of co-workers taking work over during normal working hours: <ul style="list-style-type: none"> • This leads to the postponement of less urgent (but important) tasks such as innovation (CW1). In such a case, the time should be added to the volume associated with the ill worker. OR • This occurs without a detrimental effect on a given co-worker’s own work. In this case, the co-worker’s act of taking over work is compensatory (CW5) and the time should be subtracted from the volume of work loss associated with the ill worker.
Recommendations for long-term absenteeism (> 2 weeks)	
Core	1. Multiply the duration (days or hours) by the degree (% decrease) of decreased work performance to determine the volume of work loss. Then multiply this volume by an average or function-specific (daily or hourly) salary.
Optional	1. Add the costs of decreased productivity of the replacement (C2), if the worker being replaced performed complex tasks. 2. Add the salary costs of the replacement worker (C5), but only the differential. 3. Add the cost of light duties (C6), if the light duties are not the original work of the employee. 4. If the company is entitled to reimbursement of sick leave costs via their insurance coverage (C13), then this amount should be subtracted. However, in such cases, the changes on premiums must also be considered. 5. Depending on whether or not each respective item falls under the (total quality) management practices of the company, the following items should be included: <ul style="list-style-type: none"> • Amount of time during normal working hours that co-workers provide coverage at the expense of less urgent activities such as innovation (CW1). • Amount of overtime hours required by co-workers to take over work for the absent worker (CW2). • Increased work load and pressure on the remaining co-workers (CW3). • Decreased productivity of remaining co-workers (CW4). • Time spent facilitating return-to-work of a chronically ill employee (A5).

Discussion

A challenge exists in occupational health concerning how to bridge the gap between the generation of new evidence on the efficiency of occupational health interventions and its implementation at the company level. Part of the solution may be found in standardizing the way the costs of health-related productivity loss, a key outcome, are estimated, thereby facilitating the comparability and utility of evidence for workplace decision makers. In this study, we aimed at identifying a key set of items to be included in the estimation of

productivity loss costs from a company's perspective by conducting a modified Delphi procedure. On the basis of the consensus findings and the panel members' comments, recommendations were formulated.

A primary strength of this study was the involvement of representatives from key occupational health stakeholder groups as such involvement can improve the practical applicability of research findings^{4 28}. In addition, the heterogeneous composition improved the likelihood that a wide range of opinions were collected for the formulation of the recommendations.

There were two specific observations that warrant discussion. First, although there are similarities between the three sets of recommendations, there are also differences. This finding confirms our *a priori* assumption that an item's relevance may be dependent on the type of work loss. While existing questionnaires make a distinction between presenteeism and absenteeism, the differentiation between short-term and long-term absenteeism is lacking. Our findings suggest that not all absenteeism periods are alike in their consequences, and this time component to productivity loss deserves further attention. This is in line with new concepts that sick leave and return-to-work should be seen as an evolving process and multiple phase-specific outcomes should be used³⁵. Second, with the exception of the duration and degree of short-term and long-term absenteeism and salary costs of replacements, data retrieval in companies may span a week or be regarded as impossible or require undue effort. On a practical level, the recommendations can be used as a checklist to help identify how current data registration (systems) can be improved for the purpose of routine data collection, for instance, by expansion or coupling between databases. With regards to formal economic evaluations, several tools for work productivity have been developed. For an overview, readers should consult the paper by Amick et al.¹⁹.

In a modified Delphi study in which six tools for measuring health-related productivity were evaluated, Loeppke et al. identified absenteeism, presenteeism, and employee turnover and replacement costs as key elements²¹. Our core items and one optional item are in accordance with these findings. Moreover, the co-worker related optional items point towards the third area of future research that Loeppke et al. identified: "3) examination of the impact of an individual's absenteeism and presenteeism on team dynamics and interdependent workgroups within the work environment [p.358]."²¹. In addition, a method for estimating the costs of productivity loss, which requires little direct measurement, was recently published³⁶. In this method, the co-worker related optional items are encapsulated in the so-called 'wage multiplier'. Furthermore, two questionnaires, the Productivity and Disease Questionnaire (PRODISQ)²⁰ and Health and Labour Questionnaire³⁷, which were not included in the study by Loeppke et al., were reviewed to gain insight into the differences between our recommendations and their content. The core items in our recommendations were included in both questionnaires, however, the inclusion of the optional items was variable. While our panel did not find the administrative time for planning and arranging replacements as relevant, often citing that such tasks were fundamental management activities, this item is included in PRODISQ. Also, there are differences between the items that we identified as compensation mechanisms and what Jacob-Tacke et al.²⁶ and the PRODISQ include²⁰. Conceptualization of compensation mechanisms, and the interface between what stakeholders identify as relevant, as in our recommendations, and how to measure (via measurement tools) and to value productivity loss warrants future inquiry.

There were three main limitations in this study. First, by foregoing the traditional qualitative first round, we may have inadvertently overlooked an important item. However, given that a pilot was conducted, and panel members were given the opportunity to provide suggestions, such a risk was minimal. Second, while we consider the heterogeneous composition of our panel a strength, it can be argued that this, in fact, is a weakness as the findings may be less specific. There are two possible assumptions behind this argument. First, different stakeholder groups can have different opinions, and second, the relevance of a given item may be dependent on a specific context. With respect to the former, however, a similar within-group variation in member response patterns was observed for all stakeholder groups. The latter was partially addressed by our *a priori* assumption, and by asking questions about the panel members' representative functions. In addition, the comments on the theme context-specificity were carefully considered in the formulation of the recommendations, particularly, the optional ones. Third, the findings are opinions of a single group of Dutch experts and cannot be taken to be reflective of all Dutch experts, nor of experts from different medico-socio-economic systems. Moreover, the aim of reaching consensus may have led to a diluted version of the best opinion or the lowest common denominator³².

So that some insight into this third limitation would be gained, 29 occupational health researchers and professionals from 12 countries (of whom 6 were Dutch researchers who had not participated in our study) were surveyed, following a presentation of the study's results during a recently held (February 2006) international workshop. For items designated as core items in our recommendations for presenteeism, short-term absenteeism and long-term absenteeism, the average agreement over the number of items by the participants was 100% ($N = 2$) in each case. The average participant agreement over the respective optional items was 53%, 74% and 63%. Average participant agreement for the respective excluded items was 70%, 70% and 65%. These observations suggest that the core items are generalizable, but that further attention should be paid to the potential relevance of the optional and excluded items. The disagreement may be reflective of differences between socio-economic systems, industrial sectors or companies themselves. Nevertheless, although both the generalizability and authority of the recommendations may be limited, we believe that this streamlined set of items provides a basis for standardizing the estimation of costs of health-related productivity loss from a company's perspective.

Conclusion

On the basis of the collective opinion of stakeholder representatives, recommendations for estimating the costs of productivity loss from a company's perspective have been formulated for three forms of work loss: presenteeism, short-term absenteeism, and long-term absenteeism. Additional efforts to improve current methodology should be made in collaboration with stakeholders. Although the recommendations may not be considered definitive, they represent an important step toward standardizing estimates of health-related productivity loss costs from a company's perspective, thereby facilitating the comparability and utility of economic evaluations of occupational health interventions.

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