Economic Perspectives on Return to Work Interventions

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22.1 Introduction

Organizations, whether public or private, regularly face challenging resource allocation decisions in their effort to get the most out of the resources they have available for their operations. At a broader, societal level, consideration of the resource implications of alternatives is equally as critical, since not all possibilities can be supported. Consequently, complete information on the costs and consequences of alternatives can be critical to the decision-making process. This is as true in the realm of occupational health and safety (OHS) and return to work (RTW) as it is for other areas of an organization's activities.

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The resource implications of alternatives are only part of the information considered in the decision-making process. Even if an effective intervention does not bring financial returns relative to alternative considerations, it still may be a good decision to go forward with it for a variety of reasons. At the organizational level, doing a good job of OHS and RTW is regarded as a critical part of business and is a key workplace benefit in its own right. At the societal level, precedence and priorities may be important factors considered in allocation decisions. Nonetheless, complete information on the costs and consequences of an intervention compared to the status quo or other effective alternatives is still an invaluable input into the decision of which alternative to select.

In this chapter, we focus on economic considerations–both methods and evidence—related to disability management and RTW. Some might say that it is imperative to consider economic matters in the area of disability management and RTW—at the individual, organizational, and societal level—since it is not possible to invest in all interventions that are proven effective. In the short term, consideration of the resource implications of alternatives helps get the most out of expenditures by identifying the most cost-effective interventions. In the long run, it can help achieve the highest level of labor market engagement of working age adults by identifying those interventions with the greatest value. Essentially, economic analysis provides invaluable

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information for short- and long-term decision-making at the local and national levels, for workers, employers, insurers, services providers, and society as a whole.

Undertaking economic evaluations of RTW interventions can be a challenge for a number of reasons: the policy arena of disability compensation, RTW, and labor legislation are complex, having multiple stakeholders and sometimes conflicting incentives and priorities. There are substantial differences in the perceptions of health risks associated with work experiences among the various stakeholders, in addition to a lack of consensus about what should be counted as a benefit or cost of intervening or not intervening. Moreover, there are multiple providers of indemnity and medical care coverage making it difficult to capture the full cost of work disability and the benefits of its prevention. Lastly there are industry-specific human resource practices (e.g., hiring of temporary workers and contracting out services) that can make it difficult to identify the full extent of the burden.

Often the awareness of the need to entertain a change in policy, program, or practice in disability prevention and RTW arises through tracking the burden of work disability. Burden tracking may be informal, such as monitoring disability days at the organizational level, or formalized in a societal-level burden of disease/disability study. The latter is a study that measures the total loss of healthy time (i.e., morbidity and mortality) from a particular health condition (or work disability in general), the costs of treating individuals with the condition, and the impact of the condition in terms of undesirable consequences such as lost productivity to society.

Though burden studies do not measure the probability of success of alternative options or the opportunity costs of interventions that might be undertaken to reduce the burden, these types of studies serve an important information role. They provide insights into the magnitudes of the health and productivity loss and their costs to society. This information can be used to assess how the burden may have changed over time or how a burden from a particular health condition compares to other burdens. It can also help policy decision-makers with priority setting. Burdens that appear particularly onerous may bring attention to the need to (1) increase funding for intervention options known to reduce the burden, (2) evaluate the merits (in terms of health resource implications) of burden reduction resulting from known alternatives that have not yet been evaluated, and (3) invest in research to discover options to reduce the burden in cases where no new alternatives currently exist.

Burden estimates are typically reported for a specific calendar year and are based on costs in that year for all individuals diagnosed with or living with a particular condition. These aggregate costs are also referred to as prevalence costs, because they encompass costs for individuals across the work disability trajectory, including new cases and those with long-term disabilities. Burden studies can also cost incidents longitudinally, starting from onset, and only include new cases. The time period for these longitudinal or incidence cost studies ranges from several months to the individual's lifetime. These two general types of burden studies are not directly comparable, because of differences in the time periods measured and individuals included.

In what follows, we describe the extent of the burden of work disability and then turn to economic evaluations of interventions to reduce the burden. We present an overview of methods and issues in the economic evaluation of disability management and RTW interventions and summarize evidence on the financial merits of such interventions. We end with a discussion and summary of the role of economics in intervention evaluation and investment decision-making, with a focus on disability management and RTW.

22.2 The Burden of Work Disability

The measurement of burdens from health conditions and related disability generally focuses on financial metrics. But burdens can also be depicted with nonfinancial data such as the number of cases in a population, the severity of cases, and, for work disability, the number of individuals

absent from work/unemployed, out of the labor force, or receiving disability benefits. Prevalence information on different categories of disability provides a first-level approximation of burdens across countries, but comparability can be an issue because surveys and administrative data used to estimate these statistics may be reporting on slightly different phenomena in different countries. For example, countries may use different questions to inquire about health and function. Furthermore, differences in cultural norms and other contextual factors may also influence perceptions and reporting even if similar questions are used. Program eligibility may also vary, and different types of services may be provided to support RTW. Below we provide statistics on the burden of disability across several developed countries, presenting data on both nonfinancial and financial metrics.

On average, approximately 14 % of individuals report a chronic health condition or a disability across the Organisation for Economic Co-operation and Development (OECD) countries, suggesting that disability in OECD countries is a relatively common phenomenon (OECD 2010a). The exact percentage varies from country to country, ranging from upwards of 20 % in Estonia to just over 5 % in Korea. These numbers are for disability in any social role. A focus on work disability, or nonparticipation in the paid workforce due to health, would likely produce slightly lower percentages since some individuals with health conditions may be employed as a result of accommodation by employers.

One approach to estimating the prevalence of work disability is to identify the unemployment rates of people with disability. Generally, unemployment rates in this group are twice as high as for able-bodied individuals—14 % on average in OECD countries compared to 7 % for the nondisabled (OECD 2010a). Unemployment rates do not include individuals who have given up seeking work or who have exited the labor force entirely. This issue can be addressed by comparing the employment rates of disabled people as a percentage of all disabled working age adults to the employment rates of their able-bodied counterparts. Across 27 OECD countries, employment rates for the disabled average approximately 44 % compared to 75 % for people without disabilities (data is for late 2000s, i.e., just prior to downturn in the global economy) (OECD 2010a). What is not captured in these numbers is the level and type of engagement in paid work. Some employed individuals may be underemployed, both in terms of hours worked and in the match between skill level and job challenges. The disabled are significantly more likely to be underemployed, i.e., working part-time, than nondisabled employed individuals.

Another measure associated with the burden of work disability is the number of individuals receiving disability benefits. Counts of the number or proportion of individuals who receive benefits are generally developed from administrative data sources from disability compensation programs. Given this fact, statistics of this sort are not entirely comparable from country to country due to differences in program offerings and eligibility. Nonetheless, data on disability benefit recipiency can be invaluable to understanding disability program burdens.

In 2007, the overall disability recipiency rates in OECD countries were 6 %, with high rates in Hungary, Norway, and Sweden (approximately 10 %) and low rates in the non-English-speaking OECD countries of Japan, Korea, and Mexico (below 2 %) (OECD 2010a). Countries with more universal programs had higher rates. In northern European countries, where eligibility is extensive, rates are between 8 and 11 %. In Anglo-Saxon countries, where eligibility is more limited, rates are in the 5–7 % range. In the Netherlands, benefit recipiency was quite high in the 1990s, before the introduction of reforms to reduce the use of the program as a substitute for unemployment or a transition to retirement. The Dutch experience with these reforms is described in de Jong and de Vos (2005) and de Vos et al. (2010). In general, disability benefit recipiency rates are generally much higher for older workers and even more so in countries where it serves as a transition to retirement. On average, more than half of disability benefits recipients are men, though in Nordic countries the majority are women (OECD 2010a).

As noted, data on recipiency rates fail to account for the fact that many disabled individuals do not receive disability benefits. In fact, only a minority receive benefits. On average it is 25 %, with the proportion as low as 10–15 % in Portugal and Germany and as high as 33 % in Norway, Poland, and the United States (OECD 2010a). Higher rates do not necessarily imply higher incomes, since generosity of benefits varies from country to country. Furthermore, some disabled individuals may also receive other types of benefits, such as unemployment insurance. The proportion not receiving any benefits is 10–25 % on average but as high as 50 % for some English-speaking and Mediterranean countries (specifically Canada, the United States, Spain, Greece) (OECD 2010a). Some of these disabled individuals not receiving any benefits may be employed. Between 10 and 20 % of the disabled populations from these four countries have no public pension or labor market income. For most OECD countries, the proportion of no pension or labor market income is less than 10 %.

Several comprehensive disability burden studies have been developed by Leigh and colleagues for various levels of the US economy that identify a monetary value of the burden of work injury and illness (Leigh 2011; Leigh et al. 1997, 2000, 2001, 2003, 2004). We focus on the most recent one, which estimated the burden for occupational injury and illness for the United States in 2007 (Leigh 2011). The study considers both direct and indirect costs. Direct costs refer to medical expenses and insurance administration expenses (the latter does not include benefit expenses). Indirect costs refer to output losses consisting of lost earnings, fringe benefits, and home production. The human capital approach is used to estimate output losses. The incidence-based approach is applied, where the burden is based on lifetime costs of new cases arising in the calendar year. The study identified a total burden of $246 billion (in 2007 US dollars). Table 22.1 provides details.

The total cost burden for the United States was $249.63 billion in 2007, with work disability costs (indirect costs) from both nonfatal injuries and illnesses amounting to $182.54 billion (approximately 70 % of the total). The estimated

Table 22.1 Total cost of occupational injuries and illnesses in the United States in 2007 (Adapted from Leigh 2011)

8.559 M nonfatal injuries 5600 fatal injuries		Billions of dollars ($)		Cost per incident ($)
Direct costs for injuries	Medical costs for nonfatal injuries	45.95	–	5,369
	Medical costs for fatal injuries	0.31	–	55,357
	Total medical costs for injuries	–	46.26	–
Indirect costs for injuries	Indirect costs for nonfatal injuries	139.89	–	16,344
	Indirect costs for fatal injuries	5.68	–	1,014,286
	Total indirect costs for injuries	–	145.56	–
0.427 M nonfatal illnesses 53,000 fatal illnesses		Billions of dollars		Cost per incident
Direct costs	Medical costs for nonfatal illnesses	3.17	–	7,424
	Medical costs for fatal illnesses	17.66	–	333,208
	Total medical costs for illnesses	–	20.83	–
Indirect costs	Indirect costs for nonfatal illnesses	9.09	–	21,288
	Indirect costs for fatal illnesses	27.89	–	526,226
	Total indirect costs for illnesses	–	36.98	–
Overall total			249.63	

burden likely underestimates the true value because it does not include the value of pain, suffering, and loss of enjoyment of life or homecare provided by family members. The author notes that this burden is at least as large as that of cancer. Noteworthy is the fact that workers' compensation covers less than 25 % of this burden.

In Canada, the direct cost of occupational injuries and illnesses exceeded $6 billion per year in 2001 (Tompa 2002). This estimate includes insurance administration expenses and medical services that are paid by employers through workers' compensation premiums. The indirect cost estimate for Canada is $12 billion. This number includes costs incurred by employers to accommodate injured workers who return to work, recruitment and training costs incurred for replacing injured workers, earnings lost by workers due to injury, and the lost home productivity of workers. As with Leigh (2011), the estimated burden is likely an underestimate of the true value, since it does not include costs associated with pain, suffering, and loss of enjoyment of life or home care provided by family members. Furthermore, the Canadian estimate is based on claim counts and does not address underreporting as does the Leigh estimate (2011). Underreporting is well documented in the literature and is an issue that needs to be addressed if accurate estimates of burdens are to be calculated since the magnitude of underreporting can be substantial. Shannon and Lowe (2002) found that as much as 57 % of work-related injuries are not reported.

A series of reports entitled "Economic Burden of Illness in Canada" (EBIC) were produced by the Canadian federal government to provide objective and comparable data on the burden of illness and injury in terms of both direct (health care) and indirect (output and productivity losses) costs (EBIC 1989, 1996, 1998). The most recently released report is from 1998 (EBIC 1998). It estimates that the direct and indirect cost from all health conditions for Canada in the calendar year 1998 was $159 billion or 9.9 % of GDP. The study uses a prevalence approach and considers both morbidity and mortality. Direct costs in the study include medical care and rehabilitation costs, which amount to $84 billion or 5.2 % of GDP. Indirect costs include lost earnings and home production, which amount to $76 billion or 4.7 % of GDP. Table 22.2 provides details on the direct and indirect costs estimated in this study. Overall, the estimated burden is large and likely underestimates the true value, since it only accounts for a few categories of costs.

Table 22.2 Indirect costs of injury and illness in Canada for 1998 (Adapted from EBIC 1998)

	Billions of dollars ($)		Percentage of GDP (%)	
Direct costs				
Hospital care expenditures	27.64	–	1.72	–
Drug expenditures	12.39	–	0.77	–
Physician care expenditures	11.69	–	0.73	–
Expenditures for care in other institutions	8.05	–	0.50	–
Total direct costs	–	83.95	–	5.23
Indirect costs associated with short-term disability				
Lost earnings	3.90	–	0.24	–
Lost home production	5.90	–	0.37	–
Total short-term disability indirect costs	–	9.80	–	0.61
Indirect costs associated with long-term disability				
Lost earnings	13.00	–	0.81	–
Lost home production	19.20	–	1.20	–
Total long-term disability indirect costs	–	32.20	–	2.01
Indirect costs associated with premature mortality				
Lost earnings	13.50	–	0.84	–
Lost home production	20.00	–	1.25	–
Total premature mortality indirect costs	–	33.50	–	2.09
Total direct and indirect costs		159.45		9.93

22.3 Methods and Issues in the Economic Evaluation of RTW Interventions

In this section, we review economic evaluation methods with a view to their application in evaluating the resource implications of RTW interventions. Underlying the quantification and aggregate

of costs and consequences experienced by different stakeholders is an implicit notion of social welfare. Economists have tried to identify a set of principles by which to measure and aggregate components of costs and consequences, while minimizing the number of controversial assumptions imbedded in the methodology. The area within economics where this methodology has been developed is known as welfare economics. It is the root of the economic evaluation approach known as cost-benefit analysis (CBA).

Welfare economics is focused on an abstract concept of individual valuation, known as utility, to identify the relative values placed on alternatives by individuals. Within the welfarist paradigm, utility is not comparable between individuals. This lack of comparability seriously restricts the ability to evaluate the merits of alternative health interventions because, in principle, no individual can be made worse off by a program. Essentially, the loss of one individual cannot be directly compared to the gain of another. The standard welfare economics criterion that helps circumvent this comparability issues is known as the "potential Pareto improvement criterion." This criterion requires ensuring that gainers can compensate the losers, either in theory or practice, so that no one is made worse off. An outcome where there are some gainers and no net losers (after real or theoretical compensation) is considered an unambiguous gain in social welfare. This condition is met if the monetary value of consequences exceeds the cost of the intervention (i.e., net present value of an intervention is positive).

Because welfare economics limits the set of efficiency enhancing choices that can be made due to restrictions in the comparisons allowed, economists have developed an alternative approach known as the social decision-maker approach. It is based on the notion that a benevolent decision-maker (or policymaker) can make direct comparisons of values across individuals, in order to allow for a larger number of alternatives to be compared. This paradigm is often labeled extra-welfarist because it entails the inclusion of a broader set of considerations in the measurement process (Culyer 1991). In the context of health interventions, interperson comparisons of health gains are made in order to compare alternative health interventions. Rather than maximizing social welfare, health becomes the maximand in the extra-welfarist paradigm. This paradigm is the root of the health measure known as a quality-adjusted life year (QALY) and economic evaluation methods known as cost-effectiveness and cost-utility analysis (CEA, CUA).

Monetary measures of values are generally taken from market prices, but can also be identified through nonmarket approaches such as surveys (e.g., through willingness to pay/receive studies). These nonmarket approaches are particularly relevant for measuring values that are not identified in the market or are not accurately identified. Nonmarket approaches to measuring value are most relevant for health. In some studies, health is measured in natural units specific to the intervention under consideration (e.g., disability days averted) and is kept in this form for intervention evaluation purposes. In other studies, health is measured in QALYs, which is a measure that incorporates both quality and quantity. The three ways of measuring health—in financial terms, natural units, and quality-adjusted units—are associated with three types of economic evaluations, namely, CBA, CEA, and CUA. All three use a monetary metric for the cost of intervention alternatives. It is only the metric used to capture health consequences that differs. Below we review specific approaches to measuring the value of health that are used in CBA, CEA, and CUA.

22.3.1 CBA and Monetary Measures of Health

22.3.1.1 Willingness to Pay

Willingness to pay (WTP) uses monetary units for measuring health and related consequences of an intervention (Drummond et al. 2005; Tompa et al. 2008c). This method is also called *contingent/stated valuation* because individuals are asked directly about the values they ascribe to alternatives. This approach is common in environmental assessments, but has also been used in

the health technology assessment field. WTP identifies the maximum amount an individual would be willing to pay for a health improvement. If the sum of WTP of all affected individuals exceeds the costs of implementing an alternative, then the intervention is deemed to be worth undertaking. In such a case, net losers (i.e., those who pay more for the program than the value of it to them) could theoretically be fully compensated for their losses by those who are net gainers, and some gainers would still be better off. Applied to the disability context, WTP questionnaires can be used to value interventions to improve RTW outcomes in monetary terms.

The key shortcoming of WTP measures is that they are sensitive to the ability to pay. Thus, programs benefiting those with more disposable income may be given priority over programs benefiting those of more modest means. Other concerns include whose preferences to elicit and how broadly or narrowly to cast the questions about the value of consequences. A broad question would inquire about the willingness to pay for all consequences. A more restricted WTP approach might focus only on valuing health consequences through a questionnaire, which would then require capturing non-health consequences separately through other means (e.g., by using market prices).

22.3.1.2 Compensating Wage Differentials

Compensating wage differentials are an alternative means to valuing health consequences in monetary terms (Dorman 1996; Dorman and Hagstrom 1998; Viscusi 1993). This method is also called *revealed preferences* because values are identified through the choices people make in the market rather than through direct elicitation (e.g., through the choice of a job with known health risks in exchange for higher pay). Revealed preferences generally include all the known consequences arising from health risks taken, as well as other undesirable aspects of a chosen situation that may be unrelated to health, such as the griminess of a job. Identifying compensating wage differentials requires data on different occupations, their wages, and the health risk associated with them in order to statistically estimate wage-health risk trade-offs. Information extracted from the data is used to identify the statistical value of a human life, life year, or health loss due to a health condition.

The revealed preference approach is not often used in economic evaluations for several reasons. First, developing measures for various health conditions requires identifying revealed preference situations with particular health risks and then collecting and analyzing data from them. Values for a full complement of health risks would be difficult to determine due to the absence of data and opportunities to collect them. Most studies to date have focused on the risk of death in an occupational context rather than the risk of morbidity, whereas morbidity is an important aspect of work disability. A second shortcoming is that health risk values found in different studies have been inconsistent. Third, it is difficult to know the full range of features of different jobs that bear on the wage differentials identified. They may be due to undesirable features other than health risk, such as the griminess of a particular occupation. Lastly, there may be factors present that bias the health risk values identified through revealed preferences, such as lack of information on the part of workers about the health risks of different occupations, and power imbalances between workers and employers.

22.3.1.3 Human Capital

Another monetary approach used to value health is known as the human capital approach (Drummond et al. 2005; Tompa et al. 2008c). Underlying this approach is an assumption that the value of health is primarily its human capital for use in productive activities. The focus is often exclusively on output from paid labor force engagement. To estimate the value of lost output, absence time from an occupational role is multiplied by the value of time (its price weight) in that role. The assumption underlying this calculation is that the wage value of time off work due to poor health is a good measure of lost output at the organizational and societal levels, i.e., the person is not replaced in their work role, and that output loss is enduring.

For price weights of occupational time different rates may be used. For workplace interventions, actual salaries are often used, whereas for population studies, average salaries are used. The present value of earnings losses until RTW or retirement is estimated if an absence spans longer than a year. For long duration absences, rather than assume that wages remain constant for the injured/ill worker, one can adjust earnings to reflect the standard lifetime earnings trajectory. For example, if a young adult earns minimum wage and becomes permanently and fully disabled, one could assume some earnings growth over the career that would be based on a counterfactual of what the person would have been earning if they had not been injured.

For individuals not in the paid labor force—youth, students, homemakers, and retirees—it is not clear how best to value their time in poor health. One possibility for nonpaid occupational roles (e.g., home maintenance) is to estimate what it would cost to pay someone to do that task (replacement cost) or what the person would be paid if they were in the paid labor market (see Drummond et al. 2005 for details). The latter is known as a *shadow price*.

Because the human capital approach takes a very narrow view of the value of health, it is not commonly used as the sole measure of health in program evaluation. The exception may be in the occupational health and safety field where intervention studies often take an employer's perspective whose concerns are often focused on maintaining productivity and output (Tompa et al. 2006). Weil (2001) suggests using the human capital approach to measure the value of healthy time in the paid labor force and using another approach (e.g., QALY) to capture the value of healthy time in nonwork roles and the intrinsic value of health.

There are four key concerns regarding the human capital approach. First, wage rates may not accurately reflect the marginal product of a worker due to market imperfections. Second, its focus on occupational output as the only value of health is too narrow by many accounts. Third, in its simplest form (where actual wage values are used) the approach places greater value on the time of individuals with greater earnings and lesser value on the time of individuals with lesser earnings. Fourth, a strong assumption commonly made when using this metric is that societal output losses due to an individual's long-term health condition are enduring. In reality, if a worker is absent for a long time due to a health condition, the person would likely be replaced with a worker who would eventually be equally as productive.

22.3.1.4 Friction Cost Approach

As noted, the estimation of output losses at the organizational and societal levels may be less than the sum of earnings losses of individuals who experience the health condition under consideration, as estimated by the human capital approach. In particular, organizations may replace absent workers with new hires from the ranks of the unemployed. If this is the case, output levels may return to the norm after the new hires receive training and their skill levels increase with time. The friction cost approach assumes that output losses exist only in the short run. This period is known as the friction period. Also assumed is that there is excess unemployment, such that there are a sufficient number of individuals available to take up the position made vacant by the injured/ill. Even if this is the case, the friction period may vary over the business cycle and over time as the unemployment rate varies. If studies use different friction periods for interventions executed in different time periods, comparability between studies can become a challenge.

22.4 CEA, CUA, and Nonmonetary Measures of Health

Measures that fall under the rubric of extra-welfarist use a range of intermediate and final outcome measures to value health consequences (Drummond et al. 2005). These include pain, discomfort, particular symptoms, clinical measures, particular health conditions, and general health status. These measures can be classified as specific or general, that is, specific to a particular health condition or a measure of general health. They may also be categorized as intermediate or final, that is, intermediate proxies for downstream

health outcomes or direct measures of end-state health. The choice of measure to use depends on the purpose and context of a study. The term CEA is broadly used to refer to economic evaluations that measure health in natural units. The term CUA is used specifically to refer to evaluations which use health units that capture both the quantity and quality of health.

One of the key concerns with intermediate and final health measures is the limitation on comparability. Only studies using similar measures can be compared. Even when studies use apparently similar measures, they may not be fully comparable due to the use of different measurement protocols, for example, pain being measured using different questionnaires with different scales. General health measures such as the Short Form-36 (SF-36) are more broadly applicable and comparable and have been tested for construct validity and reliability. However, such general health measures may be less responsive to health changes from an intervention than purpose-specific measures, particularly in the short run. Another concern is that non-health consequences need to be captured through other, preferably monetary measures, if they are to be included in an analysis. A third concern is the need for an external yardstick to assess the monetary value of a unit of health outcome. Essentially, the decision-maker will at some point be confronted with the need for information on how much an organization or society is willing to pay for a unit of health as a measure in the evaluation.

An alternative to measuring health in natural units is to use health-related quality of life measures. As noted, such measures combine quantity (i.e., length of time in a health state) and quality (i.e., level of morbidity) of health (Drummond et al. 2005; Gold et al. 1996). These include quality-adjusted life-years (QALYs) and variants such as healthy year equivalents (HYEs), the EuroQOL five dimensions questionnaire (EQ-5D), and disability-adjusted life-years (DALYs) (Drummond et al. 2005; WHO 2011). Preference-based multi-attribute health status classification systems, such as Quality of Well-Being, Health Utility Index (HUI), and EQ-5D, can be used as weights in conjunction with data on the length of time in health state to estimate QALYs.

Within preference elicitation exercises used to identify health-related quality of life measures, questions are generally framed for respondents in terms of the value of health outcomes for themselves. There have been ongoing discussions in the literature about how and where to capture worker time costs (labor market earnings associated with different health states) and aggregate productivity consequences associated with health outcomes when using health-related quality of life measures. Key concerns are to avoid double counting and to ensure all time costs and productivity consequences are accounted for in the analysis. The consensus seems to be to measure them separately in monetary terms.

Several issues arise with the QALYs construct. First, it is assumed that preferences for health outcomes are such that quantity (i.e., survival duration) and quality (i.e., morbidity/quality of life) are separable and divisible, which may not be the case. A second issue is how to weight QALYs when aggregating within and across individuals. The convention has been to weight units equally, regardless of their distribution, though this may not necessarily reflect societal preferences. A third issue is that QALYs only capture the value of health for clients of a program. Not captured are benefits to others, such as family and community. In economics, these are termed health externalities. They are associated with contagious diseases and sentiments, such as altruism and parentalism (e.g., the value one places on good health for others).

Table 22.3 provides a summary of measures used to value health and some of the issues that need to be taken into consideration when interpreting studies using these measures.

22.4.1 Summary Measures and Decision Rules

Choosing between one of the three types of economic evaluations (CBA, CEA, and CUA) should be based on the objective of the intervention and the question being addressed by the study. These in turn are influenced by the nature of the key outcome variable and the relevant perspective(s) to be considered. For example, if a key perspective is that of a private sector firm, CBA might be

Table 22.3 Summary of measures used to value health

Paradigm	Measure	Details	Issues	Implications for RTW program evaluation
Welfarist	Willingness to pay/receive	Monetary value of health states ascribed to alternatives by directly asking individuals about their willingness to pay/receive	– Sensitive to ability to pay/receive – Clarity needed on what to consider in the valuation	– Programs for higher income earners and individuals with more wealth may be given greater value than that for lower income earners or poorer individuals – The quality of an evaluation will depend on how well the alternatives are described to the respondents of the contingent evaluation survey
	Compensating wage differentials	Monetary value of health states identified through actual choices people make	– Includes all consequences arising from health risks taken – Data required to estimate values may not be available – Labor-market imperfections may distort values – Values found in different studies have been inconsistent	– Programs that improve health and labor-market engagement for individuals in the labor force may be given greater value than those for individuals out of the labor force – Programs for higher income earners may be given greater value than those for lower income earners – Some programs may be difficult to evaluate if relevant scenarios are not available from which to collect data – Outcomes other than earnings would not be captured
	Human capital approach	Monetary value of health states determined by multiplying the wage rate by work hours associated with alternatives	– Narrow view of the value of health – Wage rates may not accurately reflect the marginal product of the worker – Strong assumptions regarding long-term societal productivity losses	– Programs that improve health for individuals in the labour force may be given greater value than those for individuals out of the labour force – Programs for higher income earnings may be given greater value than those for lower income earnings – Programs for younger individuals may be given greater value than for older individuals – Outcomes other than earnings would not be captured in the evaluation particularly the value of an individual's good health to family and community
Extra-welfarist	Natural units	Value of health states measured in natural units that reflect immediate and final health outcomes	– Only studies using similar measures can be compared – Generic measures may be less responsive to interventions than purpose-specific measures – Non-health outcomes (e.g., worker time costs, productivity) need to be captured through other measures – Health externalities not considered – Need monetary value of a unit of health outcome to make decisions	– Many aspects of health improvements and their variations may not be captured in the evaluation – Program-specific interventions may make it impossible to compare interventions for different kinds of return to work programs – Earnings, productivity, and other non-health-related outcomes may be considered in the analysis unless explicit efforts made to include them – Value of an individual's good health to family and community will not be captured
	Quality-adjusted life-years	Value of health states measured in health quality-adjusted time units	– Quality and quantity assumed separable and divisible – Underlying axioms violated in practice – Non-health outcomes (e.g., worker time costs, productivity) need to be captured through other measures – Health externalities not considered – Need monetary value of a unit of health outcome to make decisions	– Good health treated would have the same value regardless of recipients and the distribution of gains – Measure may not be sensitive to subtle differences in program effectiveness – Earnings, productivity, and other non-health outcomes may be considered in the analysis unless explicit efforts made to measure them – Value of an individual's good health to family and community will not be captured

preferred if one of the objectives of an intervention is to reduce insurance costs through improved OHS performance. As noted, the three types of evaluations differ primarily in the measurement of the outcome (monetary metric for CBA, natural units for CEA, and utility metric for CUA), and each has its strengths and weaknesses. Including more than one type of evaluation is not uncommon, since each can provide different insights into the merits of an intervention. For example, one could undertake a CEA to better capture the health outcomes that are not readily translatable into a monetary metric (e.g., pain reduction, disability days averted) and a CBA in which health outcomes are proxied through some monetary measure (e.g., willingness to pay, reduced productivity, cost of absences). This is the approach taken by Loisel et al. (2002) in their study (i.e., they undertook both CEA and CBA).

Summary measures for CBA, CEA, and CUA are generally reported as a ratio of the cost per monetary benefit, natural unit, or QALY. Because economic evaluations compare two or more alternatives, the ratios reflect an incremental/marginal cost (relative to a comparator such as the standard program) per incremental/marginal benefit, unit, or QALY (again relative to a comparator). Calculating this ratio can be a challenge, particularly with CEA and CUA. Good guidance on decision rules is provided by Drummond et al. (2005) and Hoch and Dewa (2008). Table 22.4 provides a summary. Because both numerator and denominator in CBA are in monetary units, what values are placed in one versus the other can be inconsistent across studies making ratios across studies difficult to compare. Alternative summary measures used in CBA are net present value and payback period.

22.4.2 Issue of Perspective and Distributive Equity

Most economic evaluations of workplace interventions found in peer-reviewed journals are conducted from the perspective of the firm or company. A focus on the company perspective may be warranted if the firm is the key decision-maker, but omitting consideration of the costs and consequences experienced by other stakeholders may overlook critical costs and consequences. There is a strong normative argument for considering a broad, societal perspective and for considering the distribution of costs and consequences across various stakeholders. Specifically, the fact that there are multiple stakeholders affected by OHS issues (firms, workers and their families, unions, health-care providers, insurers, society) suggests that costs and consequences borne by all the stakeholders ought to be included in the analysis. This is the norm in other economic evaluation contexts where there are multiple stakeholders (e.g., environmental impact assessment). A broad perspective does not preclude providing information on other perspectives. In fact, a disaggregation of costs and consequences would be invaluable as it would provide insight into their distribution.

Economic evaluation is focused on efficiency. Inherent in the methodology is a need to compare and aggregate costs and consequences across individuals and across different stakeholder groups. As a result, there are equity implications of interventions that ought to be explicitly considered in an evaluation. Equity issues are commonly placed under two broad categories—distributive equity and procedural equity. The former refers to the fairness of the allocation of costs and consequences, whereas the latter refers to the fairness of the decision or allocation process. All equity constructs have inherent values embodied in them, so none can be assessed exclusively through scientific principles. Within the broad constructs of distributive and procedural equity, there are many rival notions that have been proposed. A summary of the key ones found in the literature are presented by Culyer and Tompa (2008).

22.4.3 System Design Issues

Although the public sector in most developed countries plays a role in disability compensation and support provision, countries differ

Table 22.4 Types of economic evaluations and related decision rules (Adapted from Drummond et al. 2005 and Hoch and Dewa 2008)

Type of economic evaluation	Comparison being made	Standard decision rule	Summary measure(s)	Example	Issues
CBA	Incremental cost (ΔC) compared to incremental benefit (ΔB)	If ΔC < ΔB then intervention is worth undertaking	Cost-benefit ratio; net present value; payback period	Lahiri et al. (2005): for an office ergonomics program consisting of lumbar pads, back rests, and a back school workshop the net savings per year were $70,441 with savings of $111 per worker. The benefit-to-cost ratio was 84.9, and the payback period was 0.5 months (2002 US dollars)	– Difficult to determine what to put in the numerator versus the denominator – Net present value and payback period are more likely to be affected by the scale of the intervention than the cost-benefit ratio—to address this issue, the analysis can be scaled by the relevant units such as claim, case, or worker
CEA	Incremental cost (ΔC) compared to incremental natural unit (ΔE)	If the value of a unit of effect is worth the cost as identified by the cost-effectiveness ratio, then the intervention is worth undertaking, but only if there is money available in the budget	Cost-effectiveness ratio	Loisel et al. (2002): for a disability management intervention consisting of a clinical intervention combined with occupational intervention (Sherbrooke model), at mean 6.4 years follow-up, the relative cost per days of full benefit (DFB) (compared to standard care arm) was −$67.50 per DFB saved for the clinical arm, −$88.40 per DFB saved for the occupational arm, and −$63.50 per DFB saved for the Sherbrooke arm (1991 CDN dollars)	– Studies using different natural units are not easily compared – There is a need to identify a maximum dollar value for a natural unit to be used in a decision rule – Incremental costs and/or incremental effects may be negative relative to the comparator, making it difficult to interpret the finding of an evaluation
CUA	Incremental cost (ΔC) compared to incremental natural unit (ΔE)	If the value of QALY is worth the cost as identified by the cost-utility ratio, then the intervention is worth undertaking, but only if there is money available in the budget	Cost-utility ratio	Kermode et al. (2003): for a Q fever vaccination program, increasing vaccination uptake from 65 to 100 % among meat industry workers resulted in a cost of QALY of $6,294; increasing vaccination uptake from 0 to 20 % among agricultural industry workers resulted in a cost per QALY of $7,984 (2001 AU dollars)	– It is not always clear what is captured in a QALY because there are different ways to estimate a QALY – There is a need to identify a maximum dollar value for a QALY to use in the decision rule – Incremental costs and/or incremental QALYs may be negative relative to the comparator, making it difficult to interpret the finding of an evaluation

substantially in their social security arrangements (e.g., in terms of programs provided to address income security for vulnerable populations such as single mothers, the elderly, the disabled, and the unemployed). These differences are the result of their historical, political, economic, and cultural backgrounds (Hamalainen et al. 2009). They undoubtedly bear on the degree to which vulnerable populations are integrated into the labor market and how new disability management and RTW initiatives are best integrated into existing systems. These system design differences invariably have an impact on the distribution of burdens and the costs and consequences of efforts to alleviate burdens. In turn, efforts to measure burdens and evaluate programs must take into consideration these differences.

For some countries, workers' compensation is the primary program for work injuries and illnesses (e.g., Canada, the United States, Germany, and Australia), with other public and private programs providing supports for nonwork injuries and illnesses. Other countries have a more general disability compensation scheme that does not distinguish among sources of the exposure that gave rise to poor health and disability (e.g., the Netherlands). Some countries also make a distinction between work injury and occupation diseases, with different programs for each (e.g., New Zealand).

Funding for disability schemes may also vary across countries, generally falling into one of two categories: (1) contributory and (2) general tax financed. Furthermore, some jurisdictions allow private, for-profit firms to provide coverage (e.g., the United States), whereas others have only state-run programs. Table 22.5 provides an overview of the characteristics of the work disability systems of several developed countries. A more detailed presentation of several countries' systems is provided in a series of OECD reports published over the last 10 years (see OECD 2006, 2007, 2008, 2009, 2010b for details). Hotopp et al. (2008) also provided a synopsis of several country systems.

22.5 Evidence on the Financial Merits of Return to Work Interventions

Over the last few years, workers' compensation insurers and authorities have increasingly focused on disability management issues and specifically on RTW initiatives. Many of these include a workplace-based component, such as the inclusion of the employer in the RTW transition. Some initiatives have been undertaken directly by employers, though the complexity of disability management programs generally involves the expertise of various specialties from outside the firm. Hence, many such initiatives are undertaken at the system level by a workers' compensation insurance authority or public administrator and provide disability management services to multiple industries. Disability management has been regarded as good practice since it promotes improved recovery time, and evidence suggests that it can lead to lower resource costs (Tompa et al. 2008a). In most cases, workers return to their injury employer, often initially to modified work, while concurrently receiving some kind of medical treatment and rehabilitation services.

Advancements have occurred in evaluating the effectiveness of workplace-based interventions on disability management and RTW, as well as syntheses of evidence on effectiveness. Franche et al. (2005) conducted a systematic review of quantitative research on workplace-based RTW interventions. The authors' primary goal was to review the effectiveness of these interventions. They considered three types of outcomes: work disability duration, associated costs, and quality of life of workers. The latter outcome category included measures of general health, condition-specific functional status, symptom severity, and pain levels. The review found moderate evidence that workplace-based RTW interventions decrease duration of disability and mixed evidence that they have a positive impact on workers' quality of life. MacEachen et al. (2006) undertook a qualitative systematic

Table 22.5 Characteristics of work disability systems in several countries (Adapted from Eeckelaert et al. 2010)

Welfare state regime	Country	Work disability policy system characteristics				
		Distinct work injury/ illness system	State run	Monopolistic	Private	Competitive
Liberal: in such regimes, publically provided benefits are often needs tested and modest, designed to serve those that fail in the labor market. Programs are meant to support the pivotal role of private markets	United Kingdom	–	–	–	✓	✓
	Ireland	–	✓	✓	–	–
	Canada	✓	✓	✓	–	–
	Australia[a]	✓	✓	✓	✓	✓
	The United States[a]	✓	✓	✓	✓	✓
Corporatist/Bismarckian: such regimes typically have compulsory state social insurance programs with generous entitlements and benefits dependent on contributions (i.e., requiring individuals to work for eligibility). Benefits are not a social right, rather, there are rules and preconditions that determine eligibility	Germany	–	✓	✓	–	–
	France	–	✓	✓	–	–
	Belgium[b]	✓	✓	✓	✓	✓
	Luxemburg	–	✓	✓	–	–
	Austria	–	✓	✓	–	–
Nordic/social democratic: in this regime, every citizen has entitlement regardless of contributions and prior labor market engagement. Essentially, programs are universal	Sweden	–	✓	✓	–	–
	Denmark[b]	✓	✓	✓	✓	✓
	Finland	–	–	–	✓	✓
Mixed: a hybrid of Nordic and Corporatist regimes	The Netherlands	–	–	–	✓	✓
Mediterranean: this group of southern European countries have in common the important role family networks play in providing welfare	Portugal[b]	✓	✓	✓	✓	✓
	Spain[b]	✓	✓	✓	✓	✓
	Italy	–	✓	✓	–	–
	Greece	–	✓	✓	–	–
	Cyprus	–	✓	✓	–	–
	Malta	–	✓	✓	–	–
Postcommunist: former Soviet Union Socialist Republic states are part of an Eastern European-type regime that have characteristics of various regime types and are best described as hybrid or mixed regimes	Estonia	–	✓	✓	–	–
	Latvia	–	✓	✓	–	–
	Lithuania	–	✓	✓	–	–
	Bulgaria	–	✓	✓	–	–
	Czech Republic	–	✓	✓	–	–
	Hungary	–	✓	✓	–	–
	Poland	–	✓	v	–	–
	Romania	–	✓	✓	–	–
	Slovenia	–	✓	✓	–	–
	Slovak Republic	–	✓	✓	–	–

[a]Three Australian states have state-run monopoly workers' compensation programs with the remainder of the jurisdictions having private competitive insurance markets. In the United States, most states have private competitive insurance markets for workers' compensation insurance, though some states also have state funds and four states have monopolistic state funds

[b]Belgium, Denmark, Portugal, and Spain have private competitive insurance markets for work injuries but monopolistic state provision for some or all occupational illnesses

review of RTW interventions in order to better understand the dimensions, processes, and practices of RTW. The review found that RTW interventions are quite complex in that they involve the beliefs, roles, and perceptions of many players. Goodwill and trust were highlighted as central elements for successful RTW arrangements. Additionally, social and communication barriers often existed in RTW. Intermediary players such as rehabilitation or occupational health-care providers and workplace supervisors could have the potential to help overcome the barriers and facilitate the process.

Less research has been conducted on the resource implications of disability management and RTW interventions; however, this evidence base has grown. A systematic review of intervention studies with economic evaluations found that few intervention studies undertook economic evaluations, and among the few that did, the quality of analysis was mixed (Tompa et al. 2008a). Nonetheless, the review did make a substantive statement on the evidence, based on four high-quality studies (Arnetz et al. 2003; Jensen et al. 2005; Karjalainen et al. 2004; Loisel et al. 2002) and four medium-quality studies (Greenwood et al. 1990; Hochanadel and Conrad 1993; Linton and Bradley 1992; Wiesel et al. 1994).

The eight studies were in five industrial sectors, namely, health care, manufacturing and warehousing, mining and oil and gas extraction, multi-sector, and utilities. The study interventions occurred either in North America (Canada and the Unites States) or in Scandinavia (Finland and Sweden). Table 22.6 provides details.

Seven of the eight studies conducted full economic evaluations (i.e., considered both costs and consequences), with one (Wiesel et al. 1994) undertaking a partial evaluation (i.e., considering only consequences in monetary terms). The majority of these studies employed a cost-benefit analysis, where the costs and consequences (benefits) of the intervention were compared in monetary units. The predominant outcomes of focus in the economic analysis component of the studies were the wage-replacement expenses associated with injury absence (e.g., wage cost of the absence, workers' compensation wage-replacement cost, or disability indemnity costs) and/or health-care expenses associated with the injury. In terms of study perspective taken, one study took a societal perspective, three a system-level perspective, two an employer's perspective, and two were unclear.

The eight studies contained various mixes of intervention components and features listed in the materials and methods' section. Some interventions had an ergonomics component and other education component sometimes provided through a back school, and some included physiotherapy, some included behavioral therapy and others vocational work/rehabilitation. The interventions covered a range of features, though none included all the features considered. Most had two or more, and two had only one feature. Table 22.7 provides details.

The systematic review concluded that there was strong evidence to support undertaking disability management interventions in a multi-sector setting, based on their financial benefits. This finding is based on the four high-quality intervention studies. Three of the studies took a system-level perspective, and one (Karjalainen et al. 2004) was uncertain. This latter study did not find evidence to support the financial benefits of the intervention as compared to alternatives.

A more recent systematic review that focused on controlled studies of interventions for employees with back pain also evaluated the economic evaluation evidence (Carroll et al. 2010). Of the 12 studies included in the review, only four had an economic evaluation (Hlobil et al. 2007; Jensen et al. 2005; Loisel et al. 2002; Steenstra et al. 2006). The review concluded that multidisciplinary interventions with some form of workplace involvement are more likely to be cost-effective than interventions without such a component.

A third review on interventions with economic analyses considered a broader set of interventions—ones directed at managing musculoskeletal-related sickness absences and job loss (Palmer et al. 2012). The review identified 42 studies, eight of which had formal economic evaluations (Bultmann et al. 2009; Hlobil et al. 2005; Jensen et al. 2005; Loisel et al. 2002; Meijer et al. 2006; Sinclair et al. 1997; Steenstra et al. 2006; Torsten

Table 22.6 Summary of eight disability management intervention studies (Adapted from Tompa et al. 2008a)

Study	Country	Industry	Perspective	Intervention details	Economic evaluation results
Loisel et al. (2002)	Canada	Multi-sector	Insurance system	Four arms: (1) standard care, (2) clinical intervention, (3) occupational intervention, (4) clinical intervention combined with occupational intervention (main intervention under consideration)	At mean 6.4 years follow-up, the incremental net present value per claim (compared to standard care) was $16,176 for the clinical arm, $16,827 for the occupational arm, and $18,585 for the combination arm (per worker, 1991 Canadian dollars)
Jensen et al. (2005)	Sweden	Multi-sector	Societal	Four arms: (1) standard care, (2) behavior-oriented physiotherapy, (3) cognitive behavioral therapy, and (4) behavioral medicine consisting of behavioral-oriented physiotherapy and cognitive behavioral therapy	Compared to standard care, the full-time behavioral medicine program was the most cost-effective program, since it decreased sick leave and disability pension expenses by about 137,509 Euros per subject in the female group during the first 3 years after rehabilitation. The least reduction in expenses (compared to the standard group) was with the behavior-oriented physiotherapy (reduction of 54,452 Euros)
Arnetz et al. (2003)	Sweden	Multi-sector	Insurance system	A program that included early medical, rehabilitation, and vocational interventions, as well as ergonomic improvements and adaptation of workplace conditions	The net present value (direct savings) was 972,900 Skr ($162,150 USD) or 7,164 Skr ($1,195 USD) per case/person, with a benefit-to-cost ratio being 6.8
Karjalainen et al. (2004)	Finland	Multi-sector	Unclear	Mini-intervention group (a) consisting of an interview with a physician specializing in physiatry. Mini-intervention and worksite visit group (b) and standard care group (c)	The intervention groups had significantly less days on sick leave than standard care, and the cost of sick leave and direct health care were lower, but these cost differences were not statistically significant
Greenwood et al. (1990)	The United States	Multi-sector	Insurance system	Very early intervention (VEI) consisting of health and psychosocial evaluation post-injury (8 days after injury) and recovery management/case management	The intervention was as costly as standard care and was not more effective
Hochanadel and Conrad (1993)	The United States	Manufacturing/ warehousing	Employer	On-site industrial physiotherapy program for all injuries, both work related and not. Services include evaluation, treatment, physical therapy referrals, and education in the form of a back school	Net savings from the intervention were $8.3M USD. The benefit-to-cost ratio was 9:1
Linton and Bradley (1992)	Sweden	Health care	Unclear	Five-week physical and behavioral preventive intervention consisting of (1) physical therapy and (2) behavior therapy	The intervention resulted in savings of at least twice the costs of the program ($9,715 USD or 61,198 krona)
Wiesel et al. (1994)	The United States	Utilities	Employer	An intervention consisting of an injury surveillance system with all occupational injuries reported within 24 h. Based on clinical data, a diagnosis was obtained, and a course of management was recommended according to the standardized diagnostic and treatment algorithm specific to the injury's anatomic region. Time-loss injuries were reviewed on a weekly basis during the acute phase	For low back injuries, savings from lost time and light duty for the 10-year period were $2,655,728 (average savings were 59 % compared to the base year). For knee injuries, savings were $1,369,803 (average savings of 65 %). Total savings for low back and knee injuries were more than $4M dollars. All other MSK injuries were shown to have decreased, resulting in a cumulative 10-year savings of more than $4.1M (1990 USD)

Table 22.7 Summary of components of eight disability management intervention studies (Adapted from Tompa et al. 2008b)

	Intervention components				Intervention features				
Study	Ergonomics and other education (including back school)	Physiotherapy	Behavioral therapy	Work or vocational rehabilitation	Early contact with worker by workplace	Work accommodation offer	Contact between health-care provider and workplace	Ergonomic worksite visits	RTW coordination
Loisel et al. (2002)	✓	–	–	✓	✓	✓	✓	✓	–
Jensen et al. (2005)	–	✓	✓	–	–	–	✓	–	–
Arnetz et al. (2003)	✓	–	–	✓	✓	✓	–	✓	✓
Karjalainen et al. (2004)	✓	–	–	–	–	–	✓	✓	–
Greenwood et al. (1990)	–	–	✓	–	✓	–	✓	–	✓
Hochanadel and Conrad (1993)	✓	✓	–	–	–	✓	✓	✓	✓
Linton and Bradley (1992)	✓	✓	✓	–	–	–	✓	–	–
Wiesel et al. (1994)	–	–	–	–	✓	✓	✓	–	✓

et al. 1998). The interventions had multiple components, though three did not have workplace involvement. The review concluded that no study clearly proved or disproved a positive return on investment. Though most studies found net savings from the interventions, in two of the eight studies, 95 % confidence intervals suggested that net losses were possible.

Tompa et al. (2008a) also undertook evidence synthesis on specific intervention components. The review found moderate evidence of financial merits for interventions with (1) an ergonomics and other education component, (2) a physiotherapy component, and (3) a work/vocational rehabilitation component. Limited evidence was found for interventions with a behavioral component. For evidence synthesis on specific features of interventions, moderate evidence was found for the financial merits of interventions with (1) early contact with worker by the workplace, (2) work accommodation offer, (3) contact between health-care provider and workplace, (4) ergonomic work site visit, and (5) RTW coordination. No component or feature surfaced as a dominant characteristic due to the modest number of studies and the fact that two of the studies did not support the financial merits of the intervention being evaluated. Furthermore, even with those studies that were found to be worth undertaking for their financial merits, one could not attribute this to a specific component or feature.

22.6 Discussion and Summary

Though the literature on RTW and disability management interventions is quite extensive, the economic implication of such interventions is considered in few studies. Nonetheless, there appears to be emerging economic evidence in support of multifaceted RTW intervention programs with a disability management focus, particularly ones with a workplace component. Tompa et al. (2008a) found strong evidence to support undertaking disability management interventions in a multi-sector setting, based on their financial benefits.

Several literature syntheses have criticized the lack of systematic consideration of the resource implications of interventions in the OHS and disability prevention literature (DeRango and Franzini 2003; Goossens et al. 1999; Niven 2002; Tompa et al. 2008b; Uegaki et al. 2011). Future studies ought to include economic evaluation as a standard feature of intervention evaluation. A scan of recently published studies suggests that this gap is slowly closing; there appears to be many more economic evaluations than in the past.

The quality of methods in the few intervention studies that do undertake economic analyses is mixed. Shortcomings include the following: (1) weak study design, with a predominance of before/after evaluations, (2) disconnection between effectiveness and economic analysis, (3) reliance on disability benefit insurance expenses as the sole outcome measure, (4) failure to explicitly state the study perspective, (5) failure to adjust monetary values for inflation and time preference, (6) reliance on questionable assumptions with no sensitivity analysis, and (7) scant reporting of details such as context, sample size, time period, and so on. Efforts need to be made to improve the quality of the application of methods.

Most studies that undertake economic analyses focus on work absence costs (wage costs or workers' compensation wage-replacement costs) as the sole measure of productivity losses. One concern with using absence costs is that it is a poor measure of the value of health-related productivity improvements attributable to an intervention. Productivity may be affected even while an injured/ill worker is at work. Furthermore, to accurately assess productivity, one needs to consider the nature of the production process and the product/service being produced, since factors such as team production, time sensitivity, and substitutability of a worker will affect output (Pauly et al. 2002). Workers' compensation costs are a very poor measure of absence costs. They are simply transfers and do not capture the true value of disability days. Furthermore, workers' compensation claims do not reflect the full extent of work-related injuries and illnesses. Compensable injuries and illnesses may go unreported (Shannon and Lowe

2002), and others are not compensable. Some absences may be reported under other compensation programs.

In addition to improving quality, standardization of method and reporting of burden and economic evaluation studies are necessary to improve comparability across studies. Variation in labor market legislation and disability compensation programs across jurisdictions may complicate comparability, but standardization of analysis and reporting will at least facilitate understanding of transferability and generalizability. Future international research collaborations may promote further harmonization of methods and approaches for comparing studies across countries.

In summary, the resource implications of alternatives are important information for policy decision-making. It is likely to matter even more in the future as populations in many developed countries continue to age, changes in health patterns continue to unfold, and the cost of work disability continues to increase. Information on the burdens and resource implications of alternatives are invaluable for policy decision-making at the local and national levels. However, economic information is useful only if one can discern the nature and quality of the evidence and the transferability/generalizability of the findings reported in studies. In this chapter, we reviewed the measures and methods of burden measurement and economic evaluation to provide the needed foundations useful in understanding and interpreting these studies.

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