

## OPINION

## Are cost of injury studies useful?

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Studies from the USA and Canada have attempted to estimate the economic costs associated with injury.<sup>1-3</sup> The rationale for these studies is often to provide data for priority setting (both research and policy). In other words, the expression of the cost of injury in monetary terms is thought to illustrate the importance of the problem and, therefore, its high priority for research and health services resources. For example, some authors have suggested that policy makers identify "high cost" injuries (compared with other injuries) and make these injuries a priority for treatment and prevention programs.<sup>1-3</sup>

Cost of injury studies may be useful in the "political" sense, for example, by raising public and political awareness of the burden of injury. Our argument, however, is that such studies are not helpful in the context of setting priorities for resource allocation and research activities. Furthermore, concentration on cost of injury studies may divert policy makers from what they need to know in order to maximise societal benefits from resource allocation. In this paper, we briefly describe the cost of injury method, explain why cost of injury studies have limited usefulness, and explain how, in our view, health economics can better contribute to the field of injury prevention.

### Cost of injury method

Cost of injury studies usually include both direct and indirect costs. Direct costs are those resources used to prevent, detect, and treat injury and its complications. The resource use in each of these categories is measured, valued, and summed. The most common method involves combining data on health care utilisation and costs; for example, the length of hospital stay for a specific injury is multiplied by an estimate of the cost per day for that injury. Indirect costs relate to the loss of productive output in the economy because of short and long term disability. These costs are valued using the "human capital" approach, which regards the value of a human life as equivalent to its (discounted) expected future income. Average earnings, standardised for age and sex can be used to estimate such lost output. Other, less quantifiable "costs" include the psychosocial (or adverse "quality of life") effects of the injury, for example, pain and suffering.

### Why cost of injury studies are not useful

#### BURDEN

The rationale for conducting cost of injury studies is usually to illustrate the injury burden in terms that decision makers may understand. It could be argued, however, that cost of injury studies add little to what is already known. For example, each year in the US, motor vehicle crashes account for approximately 50 000 deaths, 500 000 hospital admissions, and 4 500 000 emergency department visits.<sup>4</sup> Such measures of the health impact of motor vehicle crashes are readily available using routinely collected data. In addition, these estimates provide direct and meaningful information about the size of the problem.

Therefore, spending additional resources and research time to describe the burden of motor vehicle crash injuries in terms of dollars may not add value for two reasons. First, it could be argued that the problem is already adequately quantified. Second, it is often difficult to interpret the estimated "costs". For example, in Canada, the economic cost of coronary heart disease is estimated to be \$7.4 billion, compared with \$1.9 billion for motor vehicle traffic injuries.<sup>3</sup> Do these data demonstrate that coronary heart disease is a "bigger" problem than motor vehicle traffic injuries, by a factor of four times? Or do they mean that four times the resources ought to be allocated to coronary heart disease?

Last, it has been suggested that the human capital approach may overestimate indirect costs. For example, while not denying that an injury fatality is tragic, in many cases, loss of life will result in little lost production for *society* if those who die can be replaced from the pool of unemployed labour that exists in most countries.

#### PRIORITY SETTING

The opening line in a Health Canada report entitled *Economic Burden of Illness in Canada, 1993* states that "Comprehensive and authoritative estimates of the cost of illness (*including injury*) in Canada are vital to setting priorities for allocating limited health resources".<sup>3</sup> The implication is that priority ought to be given (in terms of health care and research resources), to problems which are the most costly. This logic is problematic for three reasons.

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(1) *Cost of injury studies use the wrong concept of "cost"*

In the process of setting priorities, the decision to allocate resources to one activity results in the "loss of benefits" that could have been obtained had resources been allocated to another activity. This economic concept is termed "opportunity cost". Therefore, to maximise societal benefits from limited resources, it is important to know how many resources an activity uses (that is, its cost) and what benefits the activity produces. It is only by having data on both costs *and* benefits that we can choose the combination of activities that maximises benefit to the community. In the health care context, the "activities" are interventions (for example, prevention, treatment, rehabilitation), the "costs" are the resources required to implement the interventions, and the "benefits" are the health gains produced.

Therefore, in priority setting for injury prevention, we need to know the costs of interventions that seek to prevent injury and the health benefits that such interventions produce. In other words, to maximise health and wellbeing in the community, it is the costs and benefits of the activities aimed at preventing injury that need to be measured, not the cost of injury itself.

(2) *Totals and margins*

A cost of injury estimate would be a useful measure of the potential cost savings to society *only* in the situation where known prevention strategies could completely prevent injury occurrence. For injury, as for most other diseases, this situation does not (as yet) exist. Therefore, policy makers are more likely to be faced with questions of whether to change the scale or form of different interventions. In this context, it is the principle of economic efficiency that is important.<sup>5</sup> This principle suggests that no program should be implemented unless its benefits exceed its costs. Further, in situations where two programs compete, priority ought to be given to the program with the largest net benefit (either benefit minus cost or health benefit per dollar spent).

This economic approach requires marginal analysis, that is, comparing the expected changes in benefits and resource use for a given intervention, compared with other interventions. Ideally, through the process of expanding or contracting different programs, rational priority setting would aim to have the ratio of marginal benefits to marginal costs equal across all programs. In other words, resource use across different programs should be shifted until the point is reached where the total benefit from available resources is maximised.<sup>5</sup> Again, in this context, the total cost of injury does not matter, it is the costs and benefits "at the margin" that is the key issue in determining the efficient use of available resources.

(3) *Is the logic of cost of injury studies correct?*

Using cost of injury studies to establish priorities for research and health services resource allocation has a circularity in the logic which (in theory) could lead to incentives that are

counterproductive to achieving efficiency. In essence, the basic philosophy is that the more injury costs, the more attention and resources it will receive. However, if services aimed at the prevention of injury could be implemented at the same level of effectiveness, but at less cost, there would be no obvious incentive to do so as it would make injury appear to be less costly and, therefore, not as high a priority!

### Contribution of health economics

In our view, health economics can best contribute to the field of injury prevention through the assessment of the costs and benefits of injury prevention strategies. Such appraisals can help policy makers determine the maximum societal benefit that can be achieved, given a finite amount of resources allocated to injury prevention.

For example, bicycle related injuries in the US have an estimated annual economic cost of approximately \$8 billion.<sup>6</sup> This information, however, is not particularly useful for decision making. Data that are useful are economic evaluations of the different strategies employed to prevent bicycle related injuries. For example, Hatzidandreu *et al* compared the costs and benefits associated with three programs designed to increase bicycle helmet use among children and youth, namely legislation, community-wide promotion, and school based promotion.<sup>7</sup> The cost per head injury avoided was approximately \$36 000 for the legislative and community based programs and around \$145 000 for the school based program. There is compelling evidence that bicycle helmets are effective in preventing bicycle related head injuries.<sup>8</sup> Therefore, such economic evaluations are useful for policy makers by demonstrating, for different programs, the resources required to prevent bicycle related head injuries.

### Conclusion

Routinely collected epidemiologic data demonstrate that injury is a substantial public health problem. It is our belief that research funds would be better spent (and the aims of health economics better served) through estimation of the effectiveness, costs, and benefits associated with different injury prevention strategies, rather than on cost of injury studies.

1 Malek M, Chang B, Gallagher S, *et al*. The cost of medical care for injuries to children. *Ann Emerg Med* 1991;20:997-1005.

2 Bonnie RJ, Fulco CE, Liverman CT, eds. *Reducing the burden of injury: advancing prevention and treatment*. National Academy Press, Washington DC, 1999.

3 Moore R, Mao Y, Zhang J, *et al*. *Economic burden of illness in Canada, 1993*. Ottawa: Minister of Public Works and Government Services Canada, 1997. (Catalogue No H21-136/1993E.)

4 Baker S, O'Neill B, Ginsburg M, *et al*. *The injury fact book*. 2nd Ed. Oxford: Oxford University Press, 1992.

5 Wiseman V, Mooney G. Burden of illness estimates for priority setting: a debate revisited. *Health Policy* 1998;43:243-51.

6 Sosin D, Sacks J, Webb K. Pediatric head injuries and deaths from bicycling in the United States. *Pediatrics* 1996;98:868-70.

7 Hatzidandreu E, Sacks J, Brown R, *et al*. The cost-effectiveness of three programs to increase use of bicycle helmets among children. *Public Health Rep* 1995;110:251-9.

8 Thompson R, Rivara F, Thompson D. A case-control study of the effectiveness of bicycle safety helmets. *N Engl J Med* 1989;320:1361-7.