

costs. On a cumulative basis since 1975, safety belt use is credited with saving more than 135,000 lives, preventing an estimated 3.8 million non-fatal injuries, and saving \$585 billion in costs. However, despite a steady rise in seatbelt use over the past decade, nonuse remains an issue. If everyone had been wearing seat belts in 2000, 9,238 people would not have died on US roads that year, 143,000 injuries would have been avoided, and \$25.8 billion in costs would have been saved.

The study reports that, instead of the culpable driver, it is society as a whole that is forced to bear the brunt of the economic consequences of motor vehicle crashes. Private insurers pay approximately 50% of all costs. Approximately 9% of the total costs are paid from public revenues (6% Federal and 3% state and localities). Third parties, such as uninjured motorists delayed in traffic, charities, and health care providers, pay about 14%. Overall, those not directly involved in crashes pay for nearly three quarters of all crash costs through insurance premiums, taxes, and travel delay. In 2000, these costs totaled more than \$170 billion.

For a complete copy of "The Economic Impact of Motor Vehicle Crashes 2000," DOT HS 809 446 (May 2002), please send a fax request to 202-366-2559, or send a written request to Cost Report Request, National Highway Traffic Safety Administration, 400–7th Street SW (NPP-20), Washington, DC 20590.

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### Commentary: Understanding and Using the New Estimates on the Economic Impact of Motor Vehicle Crashes

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vehicle crashes. *Ann Emerg Med.* 2002;40:430-432.]

The impact of motor vehicle crashes on the health of individuals and populations is well recognized. They constitute the leading cause of death between ages 1 and 34 years (over infectious diseases, cancer, cardiovascular disease, or other types of injury) and the eighth cause of death across all age groups.<sup>1</sup> For every motor vehicle fatality, approximately 79 individuals require medical attention in emergency departments.<sup>2</sup> In fact, motor vehicle injuries represent 4.2% of all visits to EDs.<sup>3</sup>

At times, even these numbers are not adequate to fully quantify the magnitude and the burden of motor vehicle crash-related injuries. In these instances, summary measures, such as economic costs or quality-adjusted life years that integrate both the incidence and consequences of fatal and nonfatal outcomes into one metric, may be very helpful. These summary measures are also critical to evaluate the benefits accrued with the implementation of preventive policies or programs aimed at reducing the incidence and consequences of injuries.

The recently released National Highway Traffic Safety Administration (NHTSA) report, "The Economic Impact of Motor Vehicle Crashes, 2000," is a welcome revision to one such integrated measure, the lifetime costs associated with motor vehicle crash-related victims.<sup>4</sup> The report updates the agency's last published 1994 figures on the lifetime consequences of crashes and their injuries to occupants and pedestrians.<sup>5</sup> The new report presents estimates of both health-related and non-health-related costs. Health-related (or injury-related) costs are the costs associated with injuries sustained in the crash and include

medical costs and emergency services, as well as workplace and household productivity losses. Non-health-related (or non-injury-related) costs include property losses, workplace costs, travel costs to other motorists affected by the crash, administrative and legal costs related to the process of claims, and the delivery of legal services. As users of these data, keeping track of which cost categories are included in the calculations is particularly important, because, for example, these "non-health-related" costs amount to \$115.3 billion, or slightly more than 50% of the total lifetime figure of \$230.6 billion presented in the report as the economic impact of motor vehicle crashes in 2000.

Important as noninjury costs are, we will focus this discussion on the health-related costs because we believe that these are more relevant to clinicians and public health professionals. Lifetime costs related to the direct medical treatment of injuries resulting from motor vehicle crashes in 2000 amount to \$32.6 billion; emergency services-related costs (eg, police, firemen) are \$1.5 billion; and workplace and household productivity losses constitute \$61 and \$20.2 billion, respectively. These figures are 57% higher than the 1994 estimates. This increase is partly a result of the rising costs of medical care, the higher values for productivity losses used in this 2000 report, and inflation, but are not a result of increases in incidence because the figures of fatal and nonfatal victims have remained relatively stable over the past years.

Other health-related costs, such as those associated with pain and suffering, are presented in Appendix A of the report. These estimates represent a helpful addition because they are typically not included in

other cost reports. On average, pain and suffering represent an additional \$18,806 per injured person, although this ranges from \$4,455 for an individual with a low-level injury scoring at 1 on the Maximum Abbreviated Injury Scale (MAIS) to \$2.4 million for someone who dies.

The report also contains breakdowns of all injury-related costs according to a number of parameters, such as MAIS for the injured individual (Tables 1 and 2), body region (Appendix H), blood alcohol level (Tables 11 through 14), and whether the crashed vehicles were speeding (Table 16). However, the reader will not find costs reported according to vehicle type, occupant seating location, or age or sex, a few of other categorizations that might have been very helpful. Age-based estimates, for example, would have been a great contribution to improved understanding of the growing fatality trends for elderly occupants in crashes.<sup>6</sup>

In addition to presenting the updated costs, the report does a remarkable job in explaining the methods used to derive such figures. As educated readers, it should be our goal to understand the origin of the cost figures, as well as to understand the origin of epidemiologic data. The figures combine the frequency of crashes and injuries with the cost per crash or injured person. To compute the frequency of crashes and injuries, NHTSA continues to use the incidence-based method, that is, every new injury case (or incident case) that occurred within a given time period is counted. The incidence figures are primarily derived from real cases collected through several NHTSA-maintained databases: the Fatal Analysis Reporting System (FARS), the National Automotive Sampling System Crashworthiness Data System (NASS

CDS), and General Estimates System (NASS GES). However, for the "Economic Impact of Motor Vehicle Crashes" report, adjustments were made to allow for all non-police-reported crashes that take place but are not included in any of those data sets.

To compute the cost per injury, the report relies on the framework known as "human capital." This approach measures the impact of the injury by assessing the changes that those injuries induce in the individual's role as a producer and consumer of goods. This includes not only the short-term costs associated with the injuries, but the lifetime or long-term costs resulting from prolonged medical care or disability. In assembling this framework, a multiplicity of data sources and adjustments are needed. We can highlight only a few of them here. For example, hospital-related medical costs were derived from hospital cost data from Maryland and New York and then extrapolated to the rest of the United States. It would have been desirable to use more generalizable estimates, such as those available from the Health Care Cost and Utilization Project, with further adjusting for the ratio of cost to charges using Medicare data. Physician costs were derived from Civilian Health and Medical Program for the Uniformed Services (CHAMPUS) data. Emergency department and postdischarge costs were derived from an array of data sources, such as the National Medical Expenditure Survey and the National Council of Compensation Insurance data. Indirect costs, such as those resulting from productivity losses, were derived from the Bureau of Labor Statistics, National Vital Statistics Reports, estimates of proportions of injured individuals with partial and total disability, and information on the relationship between household

and marketplace productivity losses. These 2 latter estimates had to be derived from the scant literature on the subject.

Overall, and considering the multiplicity of data sources and the uncertainty surrounding some of the parameters used, it would have been appropriate to generate some sensitivity analysis around the costs per injured case figures.

Nevertheless, the task of putting together this report is formidable, and NHTSA should be commended for it. Now, it is our duty as health professionals, whether clinicians or researchers, to understand well the released data and put them to good use. Researchers may use these data to evaluate the cost-effectiveness of preventive measures. One such example from the 1994 estimates is the evaluation of the cost-effectiveness of air bags.<sup>7</sup> Other professionals will find great use of these figures in their advocacy efforts to support implementation of effective interventions (eg, safety belt primary laws, lower blood alcohol concentration levels, driving while intoxicated laws). Others may choose to include these data in their educational outreach with other professionals, including lawmakers. In particular, these data would be very helpful to those emergency physicians who use the jointly sponsored ACEP–NHTSA Vehicle Injury Prevention program.\*

Incorporating these new numbers into those presentations provides a new and more powerful incentive to support injury intervention.

## REFERENCES

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\*For more information on the Joint ACEP–NHTSA Vehicle Injury Prevention program, contact Ken King, ACEP, 800-798-1822, ext. 3236.

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