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Road traffic injuries in an urban area in Mexico An epidemiological and cost analysis

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Abstract

The objective of this study was to do an epidemiological and costs analysis of the impact of road traffic injuries on the demand for emergency room services at hospitals located in the city of Cuernavaca, Mexico. The studied population included injured people who demanded medical attention at the emergency room for injuries due to events in public places, occurring between February and April 2001. Trained interviewers collected the data at the emergency room, 24 h a day. The statistical analysis included simple and bivariate analysis using χ^2 odds ratio (OR), and a confidence interval of 95%. The costs analysis included the expenses during the process of searching for and finding care for injuries. There were 433 injured people, 233 (54%) were victims of road traffic accidents, 72% of crashes, and 28% were injured pedestrian and cyclists. Variables associated with the demand of emergency care due to road traffic injuries in comparison with other accidents, were: severity of injuries (OR 2.60, CI 1.44–4.71), and thorax injury (OR 4.64, CI 1.03–20.89). Pedestrians had higher costs for health care and 80% of them had to pay out-of-pocket ($P < 0.05$). Differences between patients injured by crashes or as a pedestrian, were: age under 14 years (OR 5.9, CI 2.5–13.9), being unemployed (OR 2.1, CI 1.20–3.96), and being an elementary school student (OR 13.9, CI 3.08–63.13). The present study is, so far, the only one in Mexico to include an epidemiological and costs analysis in approaching the problem of road traffic injuries. Similar methods must be used, especially in developing countries, to reduce this important public health problem.

Keywords: Traffic; Pedestrian; Costs; Emergency room; Health services; Mexico

1. Introduction

As countries modernize and develop, motorization increases, often with an impact on road safety (Castillo and Reyes, 1997; Roberts, 2001). In Mexico, since 1989, injuries caused by traffic accidents rank third among the ten leading causes of death and are the leading cause of death for persons between ages 1 and 64 (Secretaría de Salud, 1995).

Traditionally, road traffic injuries, including occupants of motor vehicles, cyclists, motorcyclists and pedestrians, have been considered as a single problem. That is, vulnerability, exposure conditions, and risk factors involved in their occurrence were considered to be the same (Mohan, 2000). An example of the need for a distinction in factors is the fact that in Mexico City, 54% of deaths by road traffic injuries are pedestrian injuries (Híjar et al., 2000), mainly to adults in productive ages. The number of non fatal, medically attended pedestrian injuries is estimated to be about 13 for each death; that means that about 9500 injured pedestrians a year require medical attention (Híjar et al., 2001).

The study of road traffic injuries as a single item, using aggregated measurements, or making regional comparisons, is not very useful and excludes any possible identification of the magnitude of the problem for individual traffic users, their spatial and local characteristics, thus limiting the analysis of their determining factors. This is specially true in developing countries like Mexico where users, mainly pedestrians, street vendors and cyclists, share and compete for road space with motor vehicles.

It is important not to forget that the public health problem which is the object of this article has clear and profound repercussions in daily life, as a cause of death, and also generating consequences and disabilities, since in most cases, the victims do not die, but will need to adapt to changes in roles and in their daily activities during several weeks or months, and in some cases permanently, as a consequence of

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the accident. Summarizing, this event leaves a deep mark in people who are involved, as a pedestrian or as a driver, due to all the affected spheres, which go from physical to emotional, economic, family and social areas. Thus, it is very important to include the costs analysis approach to know how populations can afford the expenses generated during the process of searching for and finding care for a road traffic-related injury.

Since this phenomenon is mainly present in urban areas, this paper presents an analysis of the problem of road traffic injuries in an urban area of Mexico. Its main objective is to analyze, using an epidemiological and costs analysis approach, the impact of road traffic injuries on the demand for services at hospital emergency rooms in Cuernavaca, Mexico.

2. Methods

Cuernavaca is a city of 600,000 people, located in the central region of Mexico, 50 km south of Mexico City. It is served by three regional hospitals, two of them belonging to the social security system, and one public hospital; there are also some small private hospitals. In this study, we include two general regional hospitals, one public hospital administered by the Ministry of Health, the other by the Mexican Institute of Social Security (Instituto Mexicano del Seguro Social IMSS), and two private hospitals.

The population under study included injured people who demanded medical attention at the emergency room (ER) of the hospitals included in the study, or people who died from injuries during the period between 15 February and 30 April 2001. A cross-sectional design was used and included only those events which occurred in public places and where injuries were the cause of demand for ER services or the cause of death.

The data were collected through interviews of injured people, based on a structured questionnaire which was applied by previously trained interviewers who were permanently at the ER of the selected public hospitals, just for the study purposes, 24 h a day during the study period. Death cases were recorded at the forensic service. Analyses of death cases are not included in this paper.

The studied variables were: age, sex, day and hour of occurrence of the event, alcohol consumption during the 6 h prior to the event, pre-hospital care delivered, external cause divided into: road traffic injuries, intentional injuries, other unintentional injuries. External cause was coded according to ICD, WHO IX Rev (1995) (WHO, 1995) E800–E999. We did a specific analysis of the road traffic category to analyze the differences between demands for emergency care for injuries resulting from crashes and those resulting from pedestrian injuries. The severity of injuries was grouped in two categories: non severe, meaning all kinds of injuries that were handled and solved at the ER, and severe, which included patients who needed hospitalization or died as a consequence of injuries. The types of injuries and regions where these were located were coded according to ICD, WHO IX Rev (1995) 800–999.

The statistical analysis included: description, distribution and categorization of variables. The association between the variables was determined by an estimate of the difference in the proportions, and χ^2. The analysis of variables associated with the demand of the different external causes of injuries was done through the calculation of the odds ratio (OR), with a confidence interval of 95% (CI 95%). The statistical analysis was performed using the Stata 6.0 package.

For the cost analysis, we considered as independent variables: (A) insurance situation, defined as the right to use social security services (either private or public), as reported by the population (insured/non-insured); (B) external cause, grouped as: road traffic injuries, intentional injuries or another type of unintentional injuries; and (C) type of service-providing institution, grouped in three types of organizations: Mexican Social Security Institute (Instituto Mexicano del Seguro Social—IMSS), Ministry of Health (SSA) and private services (for-profit institutions). As a dependent variable, we considered the costs of the process of searching for and finding health care. We constructed this variable considering costs of transportation to the care providing unit and costs of health care, including medicines and laboratory tests.

3. Results

Between 15 February and 30 April 2001, there were 433 people who were injured in public places; that means an average of almost six cases per day, who demanded medical care for injuries at the ERs' of four hospitals in Cuernavaca, Mexico. Of these cases, 233 (54%) were due to road traffic accidents, 72% were due to crashes, and 28% were pedestrian and cyclist injuries. During the same time period, 54 deaths occurred on site, of which 30% were due to road traffic injuries.

3.1. Epidemiological analysis

Table 1 shows the distribution of variables according to the group of external causes where, considering the total number of cases included in the study, the mean age was figured to be 29.5 ± 17.5 years, with a predominance of males (71%) and schooling equal to high school level (57%).

The main differences observed are between the groups of traffic injuries and intentional injuries, especially with respect to alcohol intake, male gender, age 15–29 years, pre-hospital care and severity of injuries. Both groups of unintentional injuries were similar.

In Table 2 we can see the variables associated with the demand for emergency care due to road traffic injuries in comparison with injuries due to other accidents. Severity of injuries (OR 2.60, CI 1.44–4.71) and thorax injuries (OR