INSIGHTS ON THE ESTIMATE OF COSTS IN ROAD TRAFFIC ACCIDENTS

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INSIGHTS ON THE ESTIMATE OF COSTS IN ROAD TRAFFIC ACCIDENTS (Abstract): Traffic road accidents represent a major challenge for public health at world level regarding the morbidity, mortality, but also the economic implications. This study is a systematical literature review with the objective to synthesize the knowledge relating the estimate of the road traffic accidents cost, identifying, selecting and evaluating the studies carried out up to the present time to reach a consensus on this matter. When we speak about the total cost of road accidents, we should be considered four main categories: costs in the event of death, costs in the case of non-fatal injury, costs generated by the material damage and administrative costs. This study has conducted an analysis of all components of the total cost of road traffic accidents and enabled a methodological framework for conducting accurate estimates in future studies. The need for studies on this subject is given by the necessity of ways to create, precedence and verification of the methods of road traffic accidents prevention and the traffic participants protection. Finally, a true picture of the economic impact of road traffic accidents allows a complex contouring of this public health problem. Keywords: ECONOMIC BURDEN, ESTIMATION, ROAD TRAFFIC ACCIDENTS

Traffic road accident is a fortuitous event, unpredictable, produced from the guilt of one or more participants in road traffic, which causes damage to the vehicles involved as well as the injury, mutilation or even death of the persons involved (1).

Traffic road accidents represent a major challenge for public health at world level regarding the morbidity, mortality, but also the economic implications. Following World Health Organization (WHO), all over the world are produced approximately 1,250,000 of deaths and between 20 and 50 million people are injured in road accidents. In the 2015 WHO’s report, Romania appears with some 1861 deaths in 2013, representing a ratio of 8,7 to 100,000 inhabitants, in a slight decrease compared with previous years. These data point out that in comparison with the Western European states, in Romania, the mortality rate is still much higher, even though it is one of the countries which belong to the „Road Safety Program 2011-2020”. The most affected category of road users is that of pedestrians, followed by drivers (2).

The economic consequences of this true traumatic outbreaks are hard to assess, at
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the property damage is added the efforts to save the casualties, medical assistance granted to the survivors and economic loss by cutting off their productive activity or their invalidity (3-5).

Up to the present, in Romania has not been carried out an estimate of the total costs of road accidents, there isn’t a methodological framework for achieving this. This study analyzes data from scientific literature regarding the calculation of these costs and proposes to create a foundation of the methodological framework stated above.

**METHODOLOGY**

This study is a systematical literature review with the objective to synthesize the knowledge relating the estimate of the road traffic accidents cost, identifying, selecting and evaluating the studies carried out up to the present time to reach a consensus on this matter. Data collection was carried out by searching the electronically databases platforms: PUBMED, RESEARCHGATE, WEB OF SCIENCE and GOOGLE ACADEMIC using combinations of keywords such as: „cost, traffic accidents, estimation, injury, death, economic burden”. In this article, there were included studies containing information on the estimation and cost calculation methods of road accidents, the categories of costs which make up the total cost, the types of data, their origin and the way they have been analyzed and the problems encountered in collecting the data.

**RESULTS AND DISCUSSION**

When we speak about the total cost of road accidents, we should be considered four main categories: costs in the event of death, costs in the case of non-fatal injury, costs generated by the material damage and administrative costs (6-9).

**Costs in the event of death**

The costs in this category include: costs generated by receiving proper medical up to death, the costs relating to the handling of the corpse after death, the losses suffered by the family and the community, recouping the loss of life, recouping the lost productivity (9-11).

**The costs generated by medical care**

This category includes costs from pre-hospital emergency medical cares and intra-hospital emergency compartments medical care’s costs (10). Most of the victims of road accidents benefit from these medical cares, and the costs they involve are related to the ambulance service (dispatching rooms, transport, medical cares at the spot) and to the emergency compartments (consult investigations, treatment) (12). Regarding intra-hospital medical treatment, in addition to expenditure related to the diagnostic and treatment, costs of hospitalization (accommodation and meal) should be considered and. Given the complexity of these medical cares, their costs are much higher in comparison with other subcategories (10, 13).

**The costs relating to the handling of the corpse after death**

These costs include the expenses which shall begin immediately after death: corpse transport, autopsy, beautifying, funerals (11, 14). Road traffic accidents are causing violent deaths, and this is the reason for which it is appropriate to carry out forensic autopsies of the victims. Even if this activity costs are related to the category for administrative costs, we decided to include it here to have a full frame of the costs related to the death of persons involved in a road traffic accident.
The losses suffered by the family and the community

This category refers to the loss for the community and family of the activities the deceased carried out on his free time which include domestic activities (such as cleanliness, cooking, the care of children or other persons) or voluntary activities. All of this can be financially quantified with the rates of the persons who provide these services counter-cost (15, 16).

Recouping the loss of life

Recouping the loss of life is the capitalization of the pain, suffering, and mourning generated by the death of a person. Mishan, Miller, and Viscusi, have used three distinct approaches to assess the economic loss of life: "the court-award", "the injunction public" and "the willingness-to-pay". In Romania, these approaches may be assimilated with the decisions of the claims because of a penal lawsuit, respectively a civil lawsuit (16-21).

Recouping lost productivity

Krupp et al they suggested approaches for recouping lost productivity, as follows: "The gross-loss-of output", "the net-loss-of-output" and "value of time" (22). But for the study of the costs of road accidents, most of the authors have used the first approach, being considered the most simple and eloquent in this case (21, 23, 24). This approach calculates the costs relating to the age of the victim and estimated gains in the future. In Romania, the age at which begins productivity is 15 years, and the ending is 64 years (25). Also, it must be considered the unemployment rate, additional revenues included in the gross salary and it should not be forgotten the percentage of people who also work on the black market.

Costs in the case of non-fatal injury

In this category come the costs related to the: medical cares, temporary incapacity for work from the period of convalescent and permanent incapacity for work (16).

The costs generated by the medical care

In addition to the costs generated by pre-hospital emergency and intra-hospital emergency compartments medical cares described above, it adds the costs of primary, specialized long-term and recovery medical care. Primary medical care generates costs related to consulting, investigations and the treatment of the patients with less severe injuries, produced in road traffic accidents, which shall be made directly to the general practitioner. For calculating the costs of long-term specialized and recovery medical cares, it must be considered the periodic checks, home cares, the visits to the general practitioner, therapeutic reinterventions, and healing procedures (10, 26-28).

Costs due to the temporary incapacity for work

Temporary incapacity for work brings additional costs that include costs from adaptation to disability, the allowance of sick leave, loss of productivity and health or life insurance. For calculating the costs related to the adaptation to the disability, it should be considered the changes in the level of dwelling/motor vehicles and the medical devices (wheelchair, crutches, etc.) required for daily activities (22, 29). Per the laws of Romania, any person with a temporary incapacity for work receives an allowance for the sick leave arising because of the multiplication of the daily average calculation basis and the number of working days of sick leave (30). During the
last period, more people in Romania purchases life and private health insurance contracts, because of which the insurance companies, in the case of a temporary incapacity for work, are obliged to pay compensation to the insured (31).

To quantify loss of productivity due to the temporary incapacity for work it shall be considered both loss of productivity at the place of work, which is estimated by multiplying the days of sick leave with the daily gross earnings, and loss of productivity for family and community described earlier in the case of the costs related to death (32).

Costs due to the permanent incapacity to work

Estimating these costs implies: adaptation to disability, disability pension/compensation, lost productivity and health or life insurance. Depending on the degree of working capacity reduction, compensation can be paid monthly, monthly complementary personal budget and accompanying allowance (15, 22, 33). The loss in productivity is also, estimated based on the degree of working capacity reduction, starting from a total loss, in which case it is directly correlated with the loss of productivity in the event of death, described above, goes to the partial loss of working capacity, in which case the number of working hours decreases, the calculation of costs being made taking account the number of working hours lost. In terms of costs related to health or life insurance, compensation for permanent incapacity to work will be higher than if the temporary and will be directly proportional to the deficit (34-37).

Material damage costs

Costs generated by material damages include, in addition to repair costs of vehicles, private properties (houses, shops, fences etc.) or public properties (streets, indicator, guard rails, etc.) and the costs relating to the period in which those mentioned above cannot be used. Here we are talking about the costs of hiring/purchase another vehicle for personal use, public transport costs, the costs of the taxis use; also in the case of scrapping of vehicles for goods or persons transport, its owner will lose his daily income (24, 38).

Administrative costs

Administrative costs cover everything that is related to the road accident from the moment in which it takes place until the file is closed and includes the costs of firefighters and police interventions, the costs of medico-legal (autopsy, medico-legal certificate) and judiciary expenditure (33).

DISCUSSION

Proposal concerning the sources and methods of gathering data to estimate the total cost of traffic accidents in Romania

The conducted literature review allows us to establish a methodological framework for data collection required for the estimation of the total cost of road traffic accidents in Romania.

Having regard to the categories of costs resulting from the studied literature, we appreciate that to estimate the total cost of road traffic accidents it is necessary to collect data from a variety of sources and through different methods such as: analyzing databases of the Ministry of the Interior, Ministry of Health, Ministry of Labor, Family and Social Protection for the Elderly and the Ministry of Justice, analyzing
databases of insurance companies, interviews and questionnaires.

Data relating to the number, type, the severity of accidents, the number of injured or deceased victims, intervention duration, resources used (human and material), the types of material damage, etc. can be collected from the office of the Traffic Police (audits, expense reimbursements). To calculate the costs of injuries caused by traffic accidents, data (such as pre-hospital resources used, type, number, severity, and prognosis of injuries, treatment, investigations, intra-hospital resources used, accommodation and meals costs, etc.) are necessary—these data can be collected from the Ambulance Service, hospitals, general practitioner offices, by analyzing observation sheets, pre-hospital emergency records, Emergency unit records, consultation records and expense reports attached to them.

Calculating the costs related to handling corpses will be done by correlating the number of people killed with the fare imposed by the Forensic Medicine Services on autopsy and embalming corpses and tariffs of the companies that provide funeral services.

For the estimation of the costs of the losses suffered by family and community, it is necessary to use questionnaires to collect information on household and volunteer activities, duration and their frequency, because this information is then correlated with the rates charged by professionals for such activities. To capitalize loss of life, it is necessary to consult the court decisions regarding compensation in cases of road accidents. The costs related to the insurance (health, life and of the material property) will be estimated using data collected from insurance companies and will represent the sum of all compensation in case of road traffic accident considering the type of insurance and the type of damage.

Regarding the costs of adapting to disability, it is necessary to apply a questionnaire to disabled individuals and families of those with disabilities, showing the value of these costs or expenses. For loss of productivity, it is necessary to know the number of fatalities (Office of the Traffic Police), the number of persons with temporary incapacity for work and the period of incapacity and the number of those with permanent incapacity for work and the degree of loss of it and the number of reduced working hours, these figures can be collected from the Bureau of Medical Expertise and Recovery of work capacity.

Finally, in collecting the data shown above, consideration must be given to the following points: limited/restricted access to documents, documents may contain drafting error or may be incomplete, these problems must be identified, corrected and removed. Also, it must be taken into consideration the possibility that a part of the road accidents could not be declared to the police and it could be found only in the databases of the insurance companies.

**CONCLUSIONS**

When an estimate as accurately as possible of the total cost of road traffic accidents is desired, bear in mind that it is made up of a multitude of components, which requires a thorough analysis and, any difficulties which may arise during the data collection, should be considered, each time.

This study has conducted an analysis of all components of the total cost of road traffic accidents.
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traffic accidents and enabled a methodological framework for conducting accurate estimates in future studies.

The need for studies on this subject is given by the necessity of ways to create, precedence and verification of the methods of road traffic accidents prevention and the traffic participants protection. Last but not least, a true picture of the economic impact of road traffic accidents allows a complex contouring of this public health problem.

REFERENCES