

Epidemiology in traffic accidents

Elena Ciuchilan¹, Tatiana Iov², Liviu Pendefunda³

¹PhD student UMPH "Gr.T.Popa" Iași, Forensic pathologist, the Forensic Service of Neamț Romania

²Forensic pathologist, PhD, the Institute of Forensic Medicine of Iași, Romania

³2nd Neurology Department, the Emergency Clinical Hospital "Prof. Dr. N. Oblu" Iași, UMPH "Gr.T. Popa" Iași, Romania

Abstract

The industrialization and the technological advance we can afford more and more, allowed the car numbers increasing and the car accident as well. The paper presents the victim number status of Neamț area for the period of 2005-2008, split on sex and type of participant in accident. The aim is to help out the local authorities with information, more precisely the police, in order to improve the car traffic safety by getting specific measures.

Keywords: car accidents, epidemiology, forensic issues

Introduction

The heavy industrialization in the last decades, as well as the technological progress to which mankind has access on a daily basis, have made it an absolute necessity to consider the prophylaxis of traffic accidents as a research topic in epidemiology studies. Currently, at a global level, traffic accidents are the first in top worldwide on the list of causes of violent death. Up to 75% of the number of traffic accidents are reported in developing or transition countries, although only around 30% of the total percentages of vehicles are owned by them. In industrialized countries, the problem of traffic accidents has spread

in the first decades of the 20th century, when, in the USA, for instance, the number of motor vehicles has suddenly climaxed. After the Second World War, they gained importance in many European countries, as well as in Japan. After the 1970s, the developing countries become strongly dependent on motor vehicle transport, and at the same time the number of traffic accidents raised. A context of epidemic proportions is thus created. As a result, accidents become a public health issue through the impact they have in public health systems from the perspective of the money cost and human resources necessary for their management. Statistics have shown that most accidents occur on Sundays and the fewest on Wednesdays.

We are concerned with the issue of traffic accidents from a forensic perspective because of the consistent number of deaths and injuries that occur in vehicle crashes (1), (2), (6). For 2004, a number of 1.2 million deaths caused by traffic accidents and approximately 50 million injured persons was estimated worldwide (OMS, 2004) (8). These numbers are however rather imprecise, since they concern mortality on the spot. Most deaths occur at the location of the accident and because of the improvement of the safety systems

installed on the motor vehicles, the causes of death in the case of traffic accidents have evolved, including even the safety systems designed for protection (the safety belt, the airbag) (4), (5). Post-accident deaths are not considered in the statistics.

The traffic accident is a dynamic process that usually involves two main actors, namely the one who causes the accident and the one who suffers from it. But there are also many situations when the one who causes the accident is also the one who suffers, without necessarily injuring another person. The information gathered for the developing countries for the 1970s show that pedestrians, cyclists, and motorcycles account for up to 74% of the number of deceased persons, compared to the developed countries, where they represent up to 20% (8). These differences actually come from the structure of the vehicle park, irrespective of whether we consider motor vehicles (cars), two-wheel motor vehicles (motor bikes, scooters) or vehicles with no motor (bicycles). This makes the balance differ from one region of the globe to another. For example, in Asia, motorcycles are responsible for most accidents because of the high number of the owners of such vehicles, while in Latin America, pedestrians and bicyclists represent this majority (8).

Men have been identified as representing most victims of traffic accidents. Before including them in any statistics, we have to consider the role played in a traffic accident. Statistically, women cause fewer traffic accidents as drivers, but this is because women have started to own licenses in significant numbers only during the last two decades. What is certain is that irrespective of the position of men or women, the former are

on the first position among the victims of traffic accidents. Work also contributes to this situation, through the number of work trips, etc. At the end, the percentage would be approximately 75% of the deaths as pedestrians and 86% as vehicle passengers(8).

Method

Several factors lie at the basis of the occurrence of the various traffic accidents. Obviously, they start from the human one, represented either by the motor vehicle driver, who breaks the legal speed limit, drives the vehicle under the influence of alcohol, has no experience, is tired, uses tranquilizers or ataraxics, suffers from a pathological condition, or by the pedestrian, who can be in a state of ethyl intoxication, is distracted, does not observe the traffic rules, etc. The technical factor refers to the technical state of the motor vehicle, to the condition of the safety systems, of the braking, direction, or light system, to the state of the tires, etc. The final factor is chance. It can be often avoided by driving preventively, especially in conditions of road humps, descents, instable roads, rain, glaze or snow, or mud.

Given the important forensic implications of the car accidents, we focused on the forensic aspects and epidemiological data for Neamt area in terms of such events. We analyzed the accidents produced in the period 2005-2008. We were interested on the number of health care days in car accidents victims. We counted and split up the cases in ranges framed by law. The sex of the victims was an item considered as well.

The task of the medical examiner in case of traffic accidents is to draw a forensic report that presents the forensic

conclusions that will objectify the legal end of the legal report between the parties involved in the accident (3), (7), where applicable (if the parties conciliate and the law allows it). Of the information included in the examination report, we can mention the evaluation of the duration of medical care, based on which the event (deed) will be classified in a specific article of the Penal Code, a differentiation of the lesions that have been produced in a traffic accident from those that exclude or question this possibility, an evaluation of the general mechanisms of lesion occurrence (less important than in deadly accidents), a mention of all the consequences of the traumatic injuries – loss of an organ, loss of the function of an organ, permanent physical or psychological invalidity, abortion, the presentation of the victim's condition – driver, passenger, pedestrian, when the injuries may heal faster (especially

in the case of children, youngsters), initial conclusions should not be definitive. A re-examination of the injured person should be requested around this “limit” interval, in order to allow making definite evaluations.

Results

In order to support the forensic importance that should be given to traffic accidents, in what follows we present some epidemiologic information from 2005-2010. We intended to stress the incidence of these types of events in the region of Neamț.

In Figure 1 we can see, for the period 2005-2008, a much higher incidence of men as victims of traffic accidents, than that of women. The number of days of medical care is concentrated around the segment under 10 days, followed by the period 20-60 days.

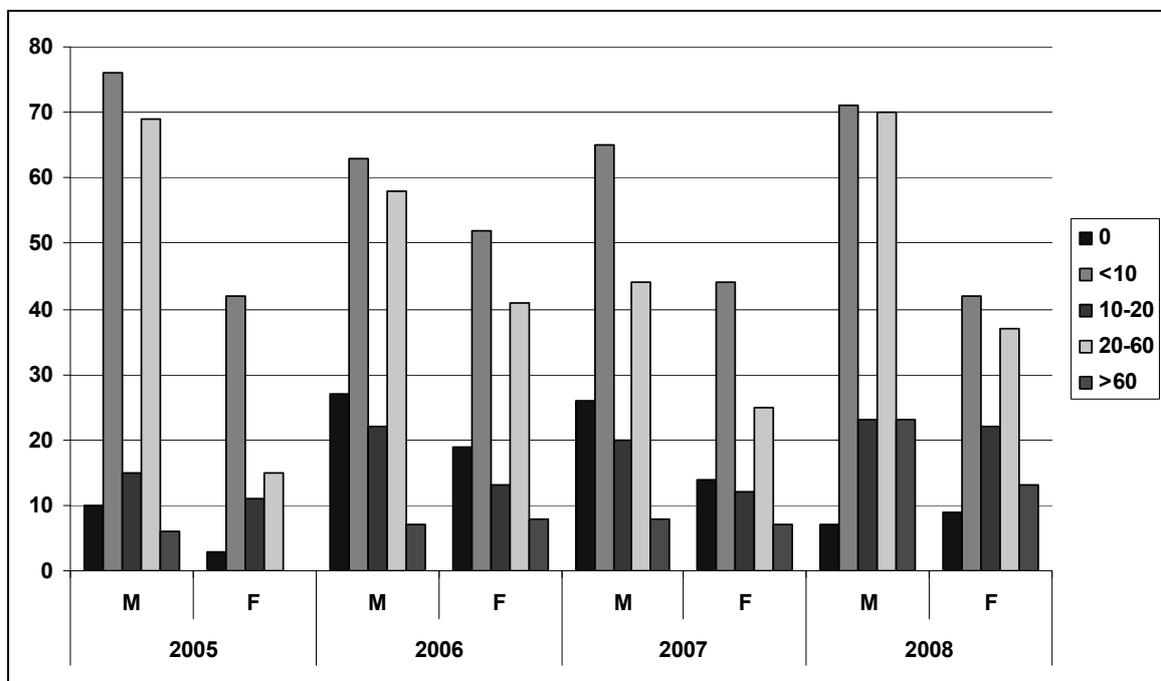


Figure 1 Victims of traffic accidents, with the number of days of medical care, according to gender, for the period 2005-2008

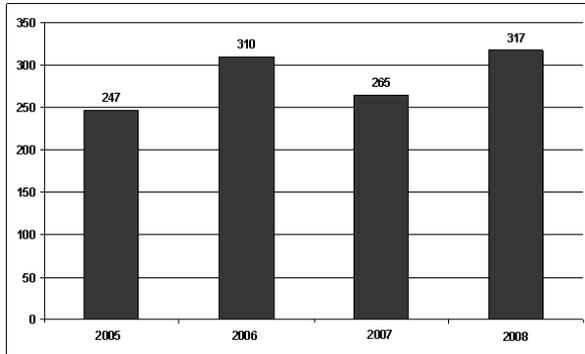


Figure 2 Victims of traffic accidents for the period 2005-2008

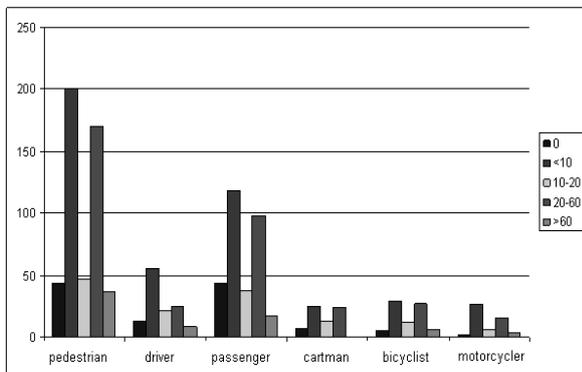


Figure 3 Victims of traffic accidents, according to the number of days of medical care, per type of accident participant

The total number of victims for the period 2005-2008 is graphically described in Figure 2.

The average evolves around the value of 290 victims in traffic accidents in the region of Neamț, per year.

Most incidents occur with pedestrians, but they do not necessarily require over 10 days of medical care, as we can see in Figure 3.

The tendency to group the majority of cases for which medical care has been granted according to gender is in the area of the group under 10 days. From a forensic perspective, the number of days of medical care is very important for the classification in a specific article of the Penal Code.

Discussions

As the studies and our data showed, the car accidents number has the tendency to increase year by year. From the Romanian law system point of view, a car accident, in case human casualties occur, special procedures must be done. The measures include among them the forensic certificate the pathologist should provide to the court. In order to force drivers to reduce the number of traffic accidents and to help the forensic pathologists for better framing of any particular case, the penal code includes a series of articles referring to the latter. These are:

Art. 178 CP – murder in default. “When a person is killed by a mechanical drive vehicle driver, whose alcohol impregnation in blood breaks the legal limit or who is inebriated, the punishment is 5 to 15 years in prison”.

Art. 180 – impact or other violence. “Impact or violence that caused an injury that requires medical care for at least 20 days in order to heal is punished with 3 months to 2 years in prison, or with a fine. The deeds mentioned in paragraph 2 that affect family members are punished with one to 2 years in prison or with a fine. The penal action starts upon the initial complaint of the injured person. In the case of the deeds mentioned in paragraphs 11 and 21, the penal action can also start ex officio. The conciliation of the parties eliminates penal accountability, even in case the penal action has started ex officio”.

Art. 181 – bodily injury. The deed that causes a damage to the physical integrity or to health, which requires medical care for at most 60 days in order to heal, is punished with 6 months to 5 years in prison. The deed mentioned in paragraph 1, if it affects family members, is punished with one to 5 years in prison. The penal action starts upon the initial complaint of the injured person. In the case of the deeds mentioned in paragraph 1, the penal action can also start ex officio. The conciliation of the parties eliminates penal accountability, even in case the penal action has started ex officio.

Art. 182 – serious bodily injury. The deed that causes a damage to the physical integrity or to health, which requires medical care for over 60 days in order to heal.

Art. 184 – bodily injury in default. The deed mentioned in paragraph 180 that has caused a damage that requires medical care for over 10 days in order to heal, as well as that mentioned in paragraph 181, performed in default. The conciliation of the parties eliminates penal accountability.

The number of traffic accidents has increased in the last few years, together with their seriousness. The blame consistently belongs to the drivers. In order to increase traffic safety and to reduce the number of accidents, the patterns that favor their occurrence should be identified. Patterns are defined by causes, by the behavior of the traffic participants, and by their attitudes. Annually, a significant number of people lose their lives in traffic, and many others remain affected following traffic accidents (physical disabilities).

The development of modern technologies and their implementation on motor vehicles make the topic of traffic accidents be always present. The interest increases as the standard injuries tend to move their center of gravity from injuries caused by impacts against objects inside the vehicle or with the vehicle itself to lesions caused by the safety systems mounted on the vehicles. The mechanical causes of the lesions, deadly or not, are completed by thermal or chemical causes generated by airbags or safety belts.

Among the most frequent causes of mortality in traffic accidents, skull traumas account for approximately 70% of the total mortality rate in the persons under 45 years of age (the population for which traffic accidents are the main cause of death).

The data we obtained from our study shows that most of the victims were pedestrians and, fortunately, most of the cases asked for less than 20 days of medical assistance.

The victim should be examined shortly after the occurrence of the accident and necessarily after a larger interval, when the evolution and prognosis of the lesion are stated. It is compulsory to analyze all the medical documents. The observation sheet sent by the medical doctor from the hospital where the person injured in the traffic accident was sent is very important. Re-examination is indicated after the clinical healing and the exhaustion of all the therapeutic means of recovery in case invalidity sequel are indicated.

The objective of the examination in case of non-deadly injuries is establishing the truth and date when the injury occurred, the conditions and manner in which they occurred, the seriousness of the trauma from the perspective of medical care, the occurrence of permanent invalidity or the loss of a sense/organ, their functional stop, etc. as well as the belated consequences of the injury on the injured person from a material perspective.

The studies showed that the countries with most number of car accidents are those with a poor road infrastructure, with weak traffic control systems, such as Ethiopia, Tanzania, Lesotho, Nekya, Bangladesh, Peru, etc. At the other hand, the countries with fewer accidents would be UK, Japan, USA, New Zealand. From the data of our study, we anticipate our position somewhere in between.

The data from the study showed an important cut of the whole statistics on the pedestrian side as victims. There could be two points here. One is that the pedestrians were the accident initiators as paying less attention to the walking near the roads rules. The other is that the driver initiated the accident by crossing the speed limit or losing car control on wet or icy roads. At

the end the statistic is the same, pedestrian victims. Anyway, an interesting result is that the drivers are not the most important part of the victim statistic. They are placed between pedestrians and passengers. Interesting is the fact that the passengers as victims exceed the drivers. This would be based on the fact the belt is not always used by others than the driver.

Conclusions

The statistics collected for the region of Neamț, presented in this paper, include a number of 1143 cases, divided over a period of 4 years (2005-2008). Because of the forensic implications, we are interested in the allocation of medical resources to the victims of traffic accidents, especially in the number of days of medical care necessary for the recovery. We have identified the fact that the number of cases that required days of medical care mainly focuses in the segment under 10 days of medical care, followed by the segment from 20 to 60 days of medical care.

Another important fact we want to emphasize is that the passengers group is quite important in the car accidents victim statistic. This is a warning flag that in spite the fact this is requested by law for both the driver and the front passenger, and for the children under 12 years old on the back seat, we assume this is not happening all the time. Given the first and second authors field of expertise, we can confirm many such cases.

From the forensic perspective, most of the cases were not subject of law

prosecution as the mentioned articles from the Penal Code would frame. The final impact of the car accidents is on the public system that must support the biggest part of the expenses like local authorities investigations, victim medical investigations, court procedures and so on. The solution to save such resources would be a better drivers informing system, road infrastructure development and correct maintenance and public education in general using all available ways.

Correspondence author:

Tatiana Iov

e-mail: tatianaguritencu@yahoo.com

References

1. Beliș V., Dragomirescu V., Naneș C., Gacea E., Panaitescu V., Drugescu N., *Medicina legală*, Ed. Teora, București, pg. 93-94, 1992
2. Beliș V., *Tratat de medicină legală*, Ed. Medicală, București, vol. 1, pg. 739-742, 1995
3. Ciurea A.V., Davidescu H.B., *Traumatologie cranio-cerebrală*, Editura Universitară „Carol Davila”, București, 2007
4. HAR NTSB/SS-86-03, NTSB Safety Study: “Performance of Lap Belts in 26 Frontal Crashes”, 225-230, 2003
5. Lupașcu C., Lupașcu C., Grămadă S., Grigoriu C., Scripcaru C., *Airbag-ul: considerații tehnice, clinico-chirurgicale și medico-legale*, *Revista Română de Medicină Legală*, vol. XI, nr. 3, București, 208-215, 2003
6. Ommaya A.K., *Biomechanics of head injury: experimental aspects*, in Nahum A.M., Melvin J., eds., *The Biomechanics of Trauma*, Norwalk CT., Appleton-Century-Crofts, 245-269, 1985
7. Plăhteanu M., Baciu Gh., Pădure A., *Aspecte medico-legale lezionale în traumatologia mecanică*, Ed. Performantica, Iași, pg. 224-236, 2004
8. Vasconcellos E.A., *Traffic accident risks in developing countries: superseding biased approaches*, ICTCT extra workshop, Campo Grande, pg. 1-11, 2005