Epidemiological Data on Injuries in Road Traffic Accidents. Surveys From the Period January 2017 to July 2020

Morbidity and Mortality Committee - AAOT

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ABSTRACT

The constant and progressive increase in mortality and disability caused by road traffic accidents is currently recognized as an endemic problem of Public Health in the national and global levels. WHO and multiple organizations work together to achieve a systematic record of road accidents and their consequences in terms of morbidity and mortality. The purpose is to generate information that contributes to decision-making in management and coordination of strategies to address this problem. Through the creation of the CMM (Morbidity and Mortality Committee) a decade ago, the AAOT has promoted the generation of a national registry of trauma injuries. This second report (based on the surveys accumulated from 2017 to July 2020) has as a general objective to describe the data collected in relation to trauma injuries caused by traffic accidents. The specific objective is to promote the incorporation of these surveys in our services, as a registration instrument. We call to renew the commitment of all institutions nucleated in this Association at the national level in the task of collecting epidemiological data that finally will allow us to improve the scientific validity of our practice and, therefore, of the publications of our specialty.

Key words: Injuries in traffic accidents; injuries in road accidents.
Level of Evidence: II

Datos epidemiológicos de lesiones en accidentes de tránsito. Encuesta del período enero 2017-julio 2020 Comité de Morbimortalidad - AAOT

RESUMEN

El aumento progresivo y constante de las muertes y la discapacidad por accidentes de tránsito es, en la actualidad, reconocida como un problema epidémico de salud pública nacional y global. La Organización Mundial de la Salud y múltiples organismos trabajan mancomunadamente para consolidar un registro sistemático de los siniestros viales y sus consecuencias en términos de morbimortalidad. Se busca generar información que contribuya a la toma de decisiones en la gestión y la coordinación de estrategias para el abordaje de esta problemática. La Asociación Argentina de Ortopedia y Traumatología, a través de la creación del Comité de Morbimortalidad hace ya una década, ha impulsado la generación de un registro nacional de lesiones traumatológicas. Este segundo informe sobre las encuestas acumuladas desde 2017 hasta julio de 2020 tiene como *objetivo general* presentar los datos recopilados sobre las lesiones traumatológicas provocadas por accidentes de tránsito. El objetivo específico es promover la incorporación de estas encuestas en nuestros Servicios como un instrumento de registro. Convocamos a renovar el compromiso de todas las instituciones del país, nucleadas en esta Asociación, en la tarea de recopilar datos epidemiológicos que finalmente nos permitan mejorar la validez científica de nuestra práctica y, por ende, de las publicaciones de nuestra especialidad.

Palabras clave: Lesiones; accidentes de tránsito; siniestros viales.
Nivel de Evidencia: II

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INTRODUCTION

For many years, the World Health Organization has been warning about the advance of "the global epidemic of diseases and deaths caused by road accidents", more commonly known as "traffic accidents". The worldwide increase in victims of this cause is permanent.

According to the World Health Organization and global health statistical sources, deaths from road traffic injuries will rise from the ninth leading cause of death to the fifth by 2030. The 2004 statistics already revealed that there are more than 1.2 million deaths per year worldwide and another 20-50 million people with non-fatal trauma injuries. However, these numbers are more worrying in terms of global public health, since it is the leading cause of death in the population aged 15-29, the second in the one aged 5-14, and the third in the one aged 30-44.[1]

It is clear then that, in the field of health, the world is in a process of epidemiological transition in which infectious communicable diseases have been losing positions in the ranking of mortality and morbidity to non-communicable diseases, associated, to a great extent, with heart disease, cancer, injuries—including those caused by traffic—and mental disorders. These have the common characteristic of allowing many years of life, but with a reduced quality of life. Thus, studies have emerged on the "Global Burden of Disease" or concepts such as "Disability-Adjusted Life Year" (DALY), etc. All of them focus on knowing and measuring the impact that different diseases have on people's quality of life.[2]

In our country, there are many institutions that are in charge of recording data related to road accidents and their victims, for example, the National Ministry of Health (through the *Encuesta Nacional de Factores de Riesgo* (National Survey of Risk Factors) or the *Dirección de Estadísticas e Información en Salud* (Directorate of Statistics and Health Information –DEIS–), the *Dirección Nacional de Información Operacional y Mapa del Delito* (DNIO) (National Directorate of Operational Information and Crime Mapping) of the National Ministry of Security, the *Dirección Nacional de Observatorio Vial* (DNOV) (National Directorate of Road Safety Observatory), the *Dirección Nacional de Vialidad* (National Directorate of Roads), among others. All these actors participate in the concentration of data and make up the *Red Nacional de Estadística Vial* (National Road Statistics Network), established by Act 26,363 and which created, in 2008, the *Agencia Nacional de Seguridad Vial* (ANSV) (National Road Safety Agency). Consequently, the National Road Statistics Network of the ANSV is considered the main source of information to measure the mortality caused by road accidents in Argentina.[3,4]

According to the ANSV, 5,611 people died in Argentina as a result of road accidents in 2017 and more than 100,000 were injured. On the other hand, deaths from external causes–which include deaths from traffic injuries–represent the fourth leading cause of death in the country, mainly in people between 15 and 34 years of age, according to 2014 DEIS data. According to the Institute for Health Metrics and Evaluation (IHME), premature deaths from traffic injuries in Argentina have gone from sixth place in 2005 to fourth in 2015, which highlights the growth of this problem in the country and recognizes road incidents as a public health problem of great relevance due to the loss of young lives and the burden of physical and psychological consequences that it generates.[2]

The ANSV and all the organizations that participate in this Road Safety Observatory work to achieve the systematic registration of road accidents and their consequences in terms of morbidity and mortality, seeking to survey the universe of events that occurred throughout the national territory, to generate information that contributes to decision-making in the management and coordination of strategies to address this problem (prevention, education, investment in infrastructure, etc.)

Regarding the type of trauma injuries related to traffic accidents and their evolution, we do not have a national registry compiling specific data that allows us to establish morbidity and mortality in our population, nor to obtain accurate national epidemiological information that can later be applied to strategies of protocolized care in the country, efficient hospital investment and, finally, publications with their own data that increase their scientific validity.

In this sense, in 2010, the *Comité de Morbimortalidad de la Asociación Argentina de Ortopedia y Traumatología* (Morbidity and Mortality Committee of the Argentine Association of Orthopedics and Traumatology) was created, understanding this global need to collect data in relation to the morbidity and mortality of non-communicable diseases linked to our specialty. In 2015, it published a survey on osteoarticular injuries that occurred due to road accidents. This survey is aimed at all institutions with emergency trauma services in the country.

The general objective of this report is to present the data obtained from 2017 to the first half of 2020. The specific objective is to promote the systematic recording of data related to injuries in our specialty produced in the context of road traffic accidents, taking into account the current and future implications of these diseases in public health.

In the first report (which can be consulted on the AAOT official website), the results of 155 surveys accumulated in the 2015-2016 period were published. In this new report, the results obtained from the 118 surveys accumulated between January 2017 and June 30, 2020, are released. It was not possible to compare the samples by annual period, due to the few records accumulated per year. However, we consider it appropriate, at least, to compare them as two groups of samples. Some of the variables under study cannot be compared, as they have been modified with respect to the original survey in order to streamline it and expand the information with more specific variables for our practice.

RESULTS

Regarding the 2015-2016 period, we observed a 15% increase in participation from the public sphere and a decrease from the private sphere and health insurances (Tables 1 and 2).

Table 1. Type of institution: frequency distribution in data contribution

Institution type	Frequency	Percentage
Public	106	89.8%
Private	9	7.6%
Health Insurance	3	2.5%
Total	118	100%

Table 2. Institutions participating in the data contribution

Institutions	Frequency	Percentage
Hospital “Carlos G. Durand”	36	31.9%
Hospital “Parmenio Piñero”	11	9.7%
Hospital “Francisco Santojanni”	4	3.5%
Hospital Británico	5	4.4%
Hospital C. San Martín	24	21.2%
HIGA “Prof. Dr. Rodolfo Rossi”	4	3.5%
Sanatorio Modelo	3	2.7%
HIGA “San José”	5	4.4%
Hospital Naval Puerto Belgrano	2	1.8%
Hospital Independencia	12	10.6%
Hospital Central de Mendoza	7	6.2%
Total	113	100%

The regions represented in the surveys are detailed in Table 3.

Table 3. Provinces: frequency distribution in the data contribution

Participating province	Frequency	Percentage
Autonomous City of Buenos Aires	51	43.2%
Buenos Aires	43	36.4%
Santiago del Estero	12	10.2%
Mendoza	7	5.9%
Not specified	5	4.2%
Total	118	100%

Variables analyzed

Sex: the percentages were similar to those of the previous report, but with 2% more women (Table 4).

Table 4. Frequency of accidents according to sex

Sex	Frequency	Percentage
Female	29	24.6%
Male	89	75.4%
Not specified	1	0.8%
Total	118	100%

Age: the range of 20 to 49 years predominated, data similar to that of the previous report. It was followed by the range of 50 to 70 years (but, unlike the previous report, with no patients older than 70 years) (Table 5).

Table 5. Frequency of accidents according to age

Age range (years)	Frequency	Percentage
<20	18	15.3%
20-49	79	66.9%
50-70	21	17.8%
Total	118	100%

Day of admission to the emergency service: in comparison with the results of the previous report, the data that remained constant was the day with the lowest number of admissions, which was Thursday. The data from the 2015-2016 surveys on the time of the accident, the type of transport, and the role of the injured party involved in the accident were not included in the subsequent surveys, so we do not have comparative data (Table 6).

Table 6. Frequency distribution according to which day of the week the accident occurred

Day of the week	Frequency	Percentage
Monday	7	5.9%
Tuesday	15	12.7%
Wednesday	23	19.5%
Thursday	7	5.9%
Friday	17	14.4%
Saturday	26	22.0%
Sunday	17	14.4%
Not specified	6	5.1%
Total	118	100%

Polytrauma: this variable was not reported in the remaining 72%, so it was not possible to estimate the frequency of this variable in the series.

Traumatic brain injury: only reported in 87 cases. In the remaining 31 surveys (26.3%), its absence was not indicated, so it was not possible to establish the frequency in this series either. However, 93% of the 87 reported cases of traumatic brain injury had no loss of consciousness (in the previous report, the frequency was 78%) (Table 7).

Table 7. Frequency distribution of traumatic brain injury with or without loss of consciousness.

Traumatic brain injury	Frequency	Percentage
No loss of consciousness	81	68.6%
With loss of consciousness	6	5.1%
Not specified	31	26.3%
Total	118	100%

Nature of injury: 136 injuries were reported in 118 registered cases: 87.5% had fractures, this remained the most frequent injury in both reports (2015-2016, 71.6%) (Table 8).

Table 8. Frequency distribution according to the nature of injury

Nature of injury	Frequency	Percentage
Fracture	119	87.5%
Dislocation	4	2.9%
Fracture-dislocation	5	3.7%
Other injuries	8	5.9%
Total	136	100%

Although it was not possible to establish an association between the variables *Traumatic brain injury* and *Nature of injury* due to underreporting, fractures were the injury most associated with traumatic brain injury (Table 9).

Table 9. Association of traumatic brain injury and osteoarticular trauma: frequency distribution

Type of osteoarticular trauma	Traumatic brain injury			
	Without loss of consciousness (%)	With loss of consciousness (%)	Not specified (%)	Total (%)
Fracture	70 (59.3%)	6 (5.1%)	26 (22%)	102 (86.4%)
Dislocation	1 (0.8%)	0%	2 (1.7%)	3 (2.5%)
Fracture-dislocation	3 (2.5%)	0%	2 (1.7%)	5 (4.2%)
Other injuries	7 (5.9%)	0%	1 (0.8%)	8 (6.8%)
Total	81 (68.6%)	6 (5.1%)	31 (26.3%)	118 (100%)

Location of injury (Tables 10-12): Regarding the type of injury, of the 115 specified, the percentage remained similar to that of the previous report from 2015-2016, with 72.2% (n = 83) of fractures in the lower limb and 22.6% (n = 26) in the upper limb. Fracture-dislocations predominated in the upper limb (6.9%), unlike a previous report where the lower limb predominated. However, dislocations maintained their predominance in the lower limb. An increase in frequency was detected in relation to fractures in the lower limb: leg and knee 49.4% and 19.3%, respectively, compared to 19.3% and 9.6% in the 2016-2016 report; ankle: 13.3% compared to 9.6% in the previous report. On the other hand, a decrease in frequency was observed on the femur, hip, and foot: 10.8%, 6%, and 1.1%, respectively, compared to 18.5%, 11.9%, and 3.7%, respectively, in the previous report.

Table 10. Injury frequency distribution according to the anatomical region.

Injuries by region	Frequency	Percentage
Spine	3	2.2%
Pelvis	3	2.2%
Lower limb	91	67.4%
Upper limb	29	21.5%
Not specified	9	6.7%
Total	135*	100%

* In 7 cases (5.1%), an association of injuries was reported in more than one region.

Table 11. Lower limb injury frequency distribution

Location of the injury in the lower limb	Frequency	Percentage
Acetabulum	2	2.2%
Hips	7	7.7%
Femur	9	9.9%
Leg	41	45.1%
Knee	19	20.9%
Ankle	12	13.2%
Foot	1	1.1%
Total	91	100%

Table 12. Frequency distribution of injuries in the upper limb

Location of the injury in the upper limb	Frequency	Percentage
Shoulder girdle	7	24.1%
Arm	5	17.2%
Elbow	2	6.9%
Forearm	7	24.1%
Wrist	7	24.1%
Hand	1	3.4%
Total	29	100%

In relation to fractures in the 2015-2016 period, the same order of frequency was reported in the upper limb, with the exception of the elbow, which maintained a higher frequency than the humerus. None were reported in the pelvis and spine in 2015-2016 (Tables 8, 13-15).

Table 13. Frequency distribution of the type of injury according to the sector of the lower limb.

Lower limb sectors	Type of injury				
	Fracture	Fracture-dislocation	Dislocation	Other injuries	Total
Hips	5	2	2	0	9 (9.9%)
Thigh	9	0	0	0	9 (9.9%)
Knee	16	0	2	1	19 (20.9%)
Leg	41	0	0	0	41 (45%)
Ankle	11	1	0	0	12 (13.2%)
Foot	1	0	0	0	1 (1.1%)
Total	83 (91.2%)	3 (3.3%)	4 (4.4%)	1 (1.1%)	91 (100%)

Table 14. Frequency distribution of the type of injury according to the sector of the upper limb.

Upper limb sectors	Type of injury				
	Fracture	Fracture-dislocation	Dislocation	Other injuries	Total
Shoulder	6	0	0	1	7 (24.1%)
Arm	5	0	0	0	5 (17.2%)
Elbow	2	0	0	0	2 (6.9%)
Forearm	6	0	0	0	6 (20.7%)
Wrist	6	2	0	0	8 (27.5%)
Hand	1	0	0	0	1 (3.4%)
Total	26 (89.7%)	2 (6.9%)	0%	1 (3.4%)	29 (100%)

Table 15. Frequency distribution of the type of injury according to the sector of the axial axis

Type of injury in the axial axis	Pelvic ring	Sacrum	Vertebra (lumbar)	Total
Fracture	2	2	2	6 (85.7%)
Other injuries	1	0	0	1 (14.3%)
Total	3 (42.8%)	2 (28.5%)	2 (28.5%)	7 (100%)

Injury condition (open or closed): it is noted that the closed injury predominated, as in the period 2015-2016 (Table 16).

Table 16. Frequency distribution of the nature of injury according to its condition

Nature of injury	Injury condition			
	Open	Closed	Not specified	Total
Fracture	35	48	36	119 (87.5%)
Dislocation	0	3	1	4 (2.9%)
Fracture-dislocation	3	2	0	5 (3.7%)
Other injuries	1	1	6	8 (5.9%)
Total	39 (28.7%)	54 (39.7%)	43 (31.6%)	136 (100%)

When an osteoarticular injury and its condition were specified compared to the 2015-2016 period, the open leg fracture ranked first, before the femur. The remaining open fractures were in the upper limb, all in the forearm or wrist, unlike the previous report where the humerus fracture slightly predominated (Table 17).

Table 17. Frequency distribution of osteoarticular trauma according to their condition, by anatomical sector.

Sector	Open fracture	Closed fracture	Open fracture-dislocation	Closed fracture-dislocation	Closed dislocation	Total % (n)
Acetabulum	0%	1.1%	0%	0%	0%	1.1% (1)
Hips	0%	4.4%	0%	2.2%	2.2%	8.8% (8)
Femur	4.4%	4.4%	0%	0%	0%	8.8% (8)
Patella	0%	2.2%	0%	0%	0%	2.2% (2)
Knee	0%	0%	0%	0%	1.1%	1.1% (1)
Tibial plate	3.3%	6.6%	0%	0%	0%	9.9% (9)
Leg	2.2%	6.6%	0%	0%	0%	30.8% (28)
Ankle	2.2%	3.3%	1.1%	0%	0%	6.6% (6)
Metatarsal	0%	1.1%	0%	0%	0%	1.1% (1)
Clavicle	0%	4.4%	0%	0%	0%	4.4% (4)
Humerus	0%	5.5%	0%	0%	0%	5.5% (5)
Proximal ulna	0%	1.1%	0%	0%	0%	1.1% (1)
Forearm	1.1%	3.3%	1.1%	0%	0%	5.5% (5)
Wrist	2.2%	0%	1.1%	0%	0%	3.3% (3)
Phalanx	0%	1.1%	0%	0%	0%	1.1% (1)
Pelvis	0%	1.1%	0%	0%	0%	1.1% (1)
Sacrum	0%	1.1%	0%	0%	0%	1.1% (1)
Lumbar vertebra	0%	2.2%	0%	0%	0%	2.2% (2)
Not specified	1.1%	3.3%	0%	0%	0%	4.4% (4)
Total	38.5% (35)	52.7% (48)	3.3% (3)	2.2% (2)	3.3% (3)	100% (91)

The Gustilo classification was specified in only 32 cases (Table 18).

Table 18. Frequency distribution of open lesions according to the Gustilo classification.

Type of open injury	Gustilo I	Gustilo II	Gustilo IIIA	Gustilo IIIB	Not specified	Total
Fracture	6	16	4	3	6	35 (92.1%)
Fracture-dislocation	1	1	0	1	0	3 (7.9%)
Total	7 (18.4%)	17 (45%)	4 (10.5%)	4 (10.5%)	6 (15.8%)	38 (100%)

Laterality: (Table 19).

Table 19. Laterality of the lesions: frequency distribution in the cases

Laterality of the lesion	Frequency	Percentage
Right	44	37.3%
Left	55	46.6%
Bilateral	2	1.7%
Not specified	17	14.4%
Total	118	100%

Multi-sectoral involvement: (Table 20).

Table 20. Fractures in more than one sector: frequency distribution in the cases

Association of fractures	Frequency	Percentage
Lower limb	9	56.3%
Upper limb	0	0%
Lower and upper limb	4	25%
Spine	1	6.3%
Spine + lower limb	2	12.5%
Total	16	100%

Type of implant in relation to its manufacture: (Table 21).

Table 21. Type of implant used: frequency distribution according to the origin of manufacture

Origin of the implant	Frequency	Percentage
Imported	7	5.9%
National	38	32.2%
Not specified	73	61.9%
Total	118	100%

Treatments used: In 71% of the cases, the selected treatment was not specified, so reliable data on the sample could not be established. However, when specified (29%), the intramedullary nail was the most used (Table 22).

Table 22. Type of treatment: frequency distribution in the cases

Type of surgical treatment	Frequency	Percentage
Intramedullary nail	14	11.3%
Locking plate	9	7.3%
Conventional plate	3	2.4%
External tutor	5	4.0%
Osteodesis	5	4.0%
Not specified	88	71.0%
Total	124	100%

Postoperative complications: they were not specified in 98.3% of the cases, so a frequency could not be established in the sample (Table 23).

Table 23. Postoperative complications: frequency distribution in the cases

Postoperative complications	Frequency	Percentage
Yes	2	1.7%
Not specified	116	98.3%
Total	118	100%

Pathological history: given the limited data collection, we were unable to establish the frequency of occurrence of complications or the association of comorbidities (Table 24).

Table 24. Pathological history: frequency distribution in the cases

Pathological history	Frequency	Percentage
Diabetes	3	2.5%
Arterial hypertension	4	3.4%
None	49	41.5%
Not specified	62	52.5%
Total	118	100%

DISCUSSION

According to the report of the National Road Safety Observatory and the Road Safety Observatory of the Autonomous City of Buenos Aires, the types of injuries that caused disabilities or even death in seriously injured persons who entered the public health system were concentrated in limbs (40.3%), whereas spinal, head, and limb injuries were the main causes of long-term disability.[2]

In the literature consulted, such as the National Survey of Road Accidents, it is explicit that, in Argentina, most of the existing data comes exclusively from administrative records. Likewise, these reports manifest that sample surveys and censuses are the main statistical sources used for the elaboration of databases. The organizations related to this area continue to work to increase the collection, for example, in 2016, the *Sistema Electrónico de Datos de Seguridad Vial* (SIGISVI) (Electronic System for Road Safety Data) was launched, which facilitates cross-linking of information with other databases.[4]

Statistics are a fundamental tool to understand and treat problems in a population.[4] At present, statistical data on specific diseases in our specialty and, in particular, those caused by road accidents, are not available. Therefore, we do not have representative and reliable national or regional epidemiological data. In this sense, this Committee continues with its strategy of collecting information that provides us with these data.

CONCLUSIONS

It is necessary to generate reliable national and regional statistical data on the most prevalent traumatic injuries in our specialty so that they provide us with reliable epidemiological information. In the near future, we consider it necessary to provide and maintain a national registry that allows us to base our medical and scientific practice on reliable and proprietary data.

Thus, we emphasize the importance of incorporating surveys, such as those presented by this Committee, in each Service as a data collection instrument. We call to renew the commitment of all the institutions at the national level, nucleated in this Association, for the contribution of these data.

Conflict of interest: The authors have no conflicts of interest to declare.

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