PROFILE OF SERVICES PROVIDED BY AN ACCIDENT AND EMERGENCY CARE DEPARTMENT IN CONNECTION WITH ROAD TRAFFIC INJURIES INVOLVING CHILDREN, 2003–2005

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SUMMARY

Objective: To study profile of services provided by an accident and emergency care department (AECD) in connection with road traffic injuries involving children in "St. Maria" University Paediatrics Hospital, Iaşi, Romania.

Methods: The survey represents a descriptive analysis of 2003–2005 data regarding the 538 injured children aged 0–18 years and allowed to design the request pattern based on: a) comparison between observed case distribution by weekday, month and season and hypothetical equal distribution using χ^2 test; b) most common features of cases.

Results: Injuries ranged from 4.3% in March to 12.3% in August, being significantly higher in summer. Children aged 5–14 years represented 65.6%. The male : female and urban : rural ratios were 1.3 : 1 and 1.5 : 1, respectively. Two in three cases were found to suffer head injury, and one in two children suffered abdomen/ pelvis contusions.

Conclusion: More road traffic injuries attended the AECD during summer. The common case was male gender aged 5–14 years, urban area, with head injury and abdomen/ pelvis contusions.

Key words: child road traffic injuries, university paediatrics hospital, accident and emergency care department

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INTRODUCTION

Child road traffic trauma is a leading cause of injury in children and represents a major worldwide public health issue. In developed countries, road injuries and deaths involving children increased significantly with intensifying auto traffic in the 5th and 6th decade of the last century (1, 2). After successful preventive campaigns initiated in these countries, road traffic crashes decreased, but still remain an important cause of invalidity and mortality in children, whereas in developing and undeveloped countries child deaths and injuries keep increasing with the growing number of vehicles (3).

The most serious problem facing the children relates to the fact that their physical and cognitive skills are not completely developed and their smaller stature makes it difficult for them to see and to be seen. This is the reason why children are especially vulnerable (4, 5).

Road traffic consequences imply various issues, such as suffering, invalidity, posttraumatic disorders, absenteeism or costs of medical care. The last include emergency treatment, initial medical costs and for severe injuries, the costs of long term care and rehabilitation (4, 6).

Pre-hospital care represents a chain of opportunities for intervening across a longer time scale. This chain involves bystanders at the scene of the crash who contact emergency service and apply first aid, emergency rescue services performed by fire-fighters in case of victims trapped in a vehicle and access to the emergency care system (7). The emergency care system includes early intervention by trained personnel from the ambulance, transport to a hospital and the accident and emergency care department (AECD).

Post-impact chain of care delivered in road injuries is presented in Fig. 1. The aim of post-impact care is to avoid preventable death and disability, to limit the severity of injury and to ensure the crash survivor's best possible recovery and reintegration into society (4,7).

The AECD represents the endpoint of this post-impact chain and the interface between pre-hospital and hospital care for all trauma and emergencies, thus, preceding hospital complex care provided in traumatology and intensive care departments.

The paper describes the impact of road traffic injuries involving children upon the AECD of the "St. Maria" University Paediatrics Hospital from Iaşi, Romania. The findings of the study allowed description of request pattern of this department in road crashes injuries involving children.

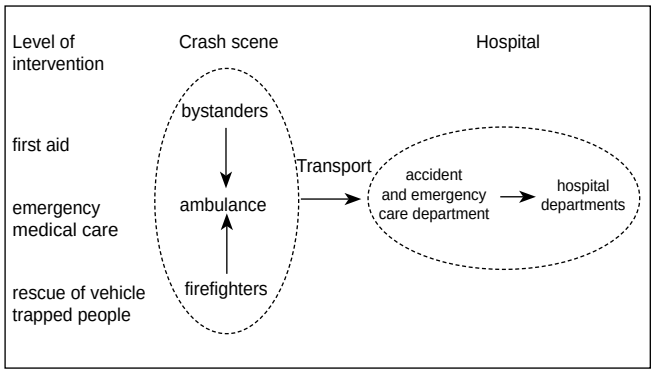

Fig.1. *Post-impact chain of interventions from crash scene to hospital in road traffic injuries.*

The mortality rate induced by road traffic injury in Romania was of 3.8 per 100,000 0–14-year-old children, compared to 4.3 deaths per 100,000 children being reported in the AECD catchment area of the University Paediatrics Hospital that corresponds to the district of Iaşi.

According to Romanian legislation, non fatal injuries can be either severe, requiring duration of hospital stay exceeding 15 days, or minor injuries, requiring less than 15 days of hospital care. The national rates of severe and minor injuries were 7.9 cases per 100,000 0–14-year-old children, and 108 respectively. In the district of Iaşi, these indicators pointed out higher values, both for severe and minor trauma (10.6 and 230 cases per 100,000 children) (8).

At country-wide level, distribution of deaths among children by road user status was: pedestrians (81%), car occupants (13%), cyclists (4%) and others (2%). This type of information is systematically recorded in fatal cases and in severe injuries (police reports, death certificates, and hospital medical files from intensive care or traumatology departments, except the AECD files).

METHODS

This study represents a descriptive epidemiological analysis of 2003–2005 data from the AECD of the investigated hospital. A total number of 538 non-fatal road trauma cases aged 0–18 years referred for an emergency care to this hospital. The data sources were files containing information about 538 patients, such as: the event (date, including the weekday), demographic issues (age, gender and residential area), diagnosis of non-fatal injuries and afterwards case evolution. Compared was the observed distribution of road injuries by month, season, and weekday with hypothetical and symmetrical distribution with equal number of cases per temporal unit.

Distribution of all cases by road user status could not be performed due to lack of information (in AECD these data are not recorded). However, the proportion of pedestrians, cyclists and car occupants may be partially assessed from hospital records only for children admitted in the University Paediatrics Hospital, but they represent 31.3% of total cases arriving in AECD. In rest of cases, such as minor injuries that need only ambulatory care (44.5%) and some trauma requiring immediately transfer to other hospitals (24.2%), this information was unavailable.

The database and data analysis were performed using EPI INFO v.6.0 software. The significance of any observed difference was determined with χ^2 test. Statistical significance was set at $p < 0.05$.

RESULTS

A total number of 538 children attending the AECD for road injuries were reported between 2003 and 2005. Depending on the moment of occurrence, the distribution of injuries was analysed by month, by season and by weekday.

The distribution of the 538 injuries by month was unequal with the lowest incidence reported in March (26 cases – 4.8%) and the highest number of cases in August (67 cases – 12.3%) (Fig. 2).

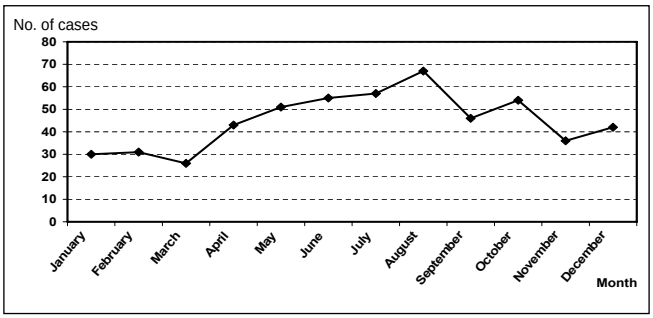

Fig. 2. *Distribution of road traffic injuries attending the AECD by month, 2003–2005.*

When comparing the observed distribution by month with an expected equal distribution across the year, significant differences have been found ($p < 0.001$). Analysis of casualties by season pointed out values ranging from 103 cases (19.2%) in winter to 179 cases (33.1%) in summer (Fig.3).

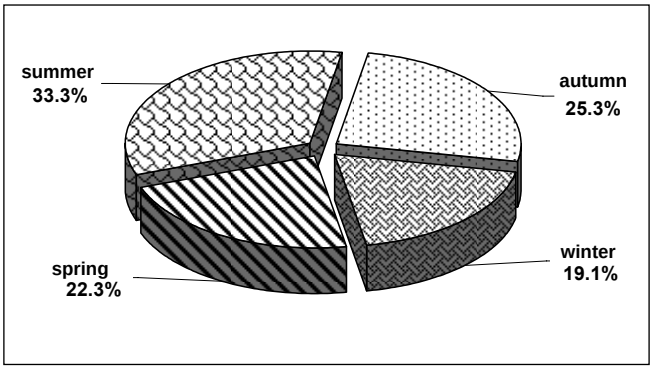

Fig. 3. *Distribution of road traffic injuries attending the AECD by season, 2003–2005.*

When comparing the observed injuries sustained by the 538 children during the four seasons with an expected equal distribution, significant differences have also been found ($p < 0.001$).

Evaluation of trauma by weekday pointed out to relatively low variations. The proportion of cases ranged from 11.5% on Thursday, in the middle of the week, to 17.5%, during a weekend.

In this case, despite the higher number of children attending the AECD during a weekend, the differences among the observed values in comparison with the equal distribution across a week were not significant ($p > 0.05$).

During 2003–2005, in AECD road injuries arrived in 404 days (36.8%). Just one case a day attended the AECD in almost three quarters (73.3%) of the respective days. Two cases a day were recorded in 21.8% and from three up to five cases were recorded in 4.9% of the analysed days.

The median age of injured children was 9 years (range 0–18 years). The lowest number of injuries occurred in children up to 1-year-old, whereas the highest number was in 6 years old children. Children aged between 5 and 14 years accounted for almost two thirds of all cases (65.6%).

The burden of injury was unequal. More boys (57.4%) were injured than girls, the male:female ratio of injuries being 1.3:1. In the same time, children from urban area sustained more often road trauma (59.8%) as compared with rural area. The urban:rural ratio of non-fatal injuries was 1.5:1.

The leading non-fatal injuries as a result of road traffic collisions were: head injury (60.8%) and abdomen/pelvis contusions (50%) (Fig. 4). These were followed by far less number of open wounds (23.2%), various fractures (up to 17.8%) and internal injuries (2.04%).

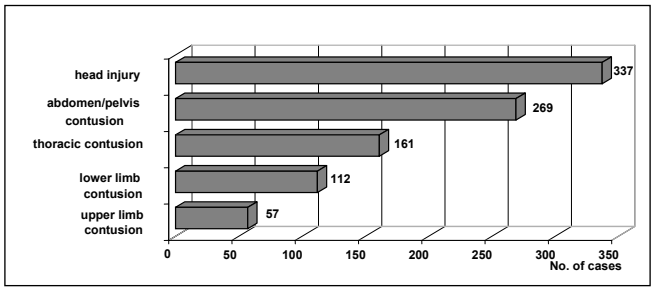

Fig. 4. *Leading road injuries arrived in AECD, 2003–2005.*

The most frequent fractures were observed in lower limb (17.8%), followed by fractures of upper limb (8.9%), cranial and face bones (3.9%), and pelvis (3%). Of the 337 head injuries, 40 had concussion accompanied by various degrees of consciousness alteration (11.9%). 85.1% of children presented with multiple trauma (> 2 injuries).

A proportion of 24.2% of cases has been referred to hospitals providing other medical care than the analysed hospital, such as maxillo-facial and neurosurgery, 31.3% required admission for complex care in the paediatric hospital, and 44.5% children were discharged after 24 hours of hospitalised monitoring in AECD.

DISCUSSION

The observed distribution of injuries by month and by season was non-random. The findings revealed p-value smaller than 0.001 by 11 degrees of freedom in analysis by month and similar p-value, but by three degrees of freedom in analysis by season. This unequal request of the AECD from the paediatric hospital pointed out that other factors need to be taken into consideration.

Many studies emphasize that across one year the number of casualties of all age as a consequence of road crashes increases from May to November. In case of children sustaining road traffic injuries, the peak of the distribution curve is situated in summer (4, 8). Similar findings were obtained in our study, the highest number of cases attending the AECD being recorded in warm season, especially in August. Most part of summer, children are in holiday and this means an increase in playtime outside home and less surveillance from adults. That's why in summer, the emergency care system (including AECD) is more often required in case of children sustaining road traffic injuries.

The distribution of cases by weekday showed the highest level in weekends (Saturday), but variations among days were not significant as presented previously in results section. Thus, we may consider that during a week relative low variations in road emergency number were recorded. Despite many children are spending the weekend playing outside, traffic casualties in this interval is not significantly increased compared with other days.

During 2003–2005, one in three days at least one child attended the AECD as a consequence of road injury. In days with this type of reported cases, the probability of having exactly one case is high (73.3%) compared with two or more than two cases a day (21.8% and 4.9%, respectively).

The main demographic features of the 538 cases were: child aged 5–14 years, male gender, living in urban area. The majority of cases were aged between 5 and 14 years (65.6%), a possible explanation being that children under 5 years are carefully watched over by the family and they are not playing or walking alone in the street like elder children, while children over 14 years are more aware of road traffic risks.

In Romania, due to lack of special playing yards, many children are playing in inappropriate places situated close to roads or vehicle circulated streets.

The gap between genders among children is similar with that recorded in adult road traffic injuries. Children and especially boys are often exposed to road injuries as pedestrians during playing time, and less as vehicle occupants (9).

The most frequent reported diagnoses were head injury, followed by abdomen and pelvis contusions, accounting for more than half of all attended cases.

Researchers emphasized that many children are hit by the front of the car (4, 10). The most severe injuries due to collisions with cars are related to impact between:

a) the head of the pedestrian and the whole area of the car bonnet top and windscreen;
b) the pelvis or the abdomen and the bonnet edge;
c) the abdomen or chest of children or the head of small children and the bonnet edge;
d) the legs and the car bumper.

Two in three children involved in every day traffic accidents were found to suffer head injury, and one in two children suffered abdomen/pelvis contusions.

CONCLUSION

Taking into consideration all these findings, profile of services

provided by the Accident and Emergency Care Department of the "St. Maria" Paediatric Teaching Hospital from Iaşi, Romania, in connection with road traffic injuries involving children was described.

This pattern was based on:

a) comparison between observed case distribution by weekday, month and season and hypothetical equal distribution using χ^2 test;
b) most common features of cases.

More road trauma attended the AECD during summer, without a specific weekday distribution. The common case was male gender, aged 5–14 years, urban area, with head injury and abdomen/pelvis contusions. Knowing the request pattern allows:

1. a faster and more efficient adaptation of AECD to the dynamics of road traffic injuries involving children;
2. a better orientation of medical staff facing with these cases.

Two main recommendations arise:

- Taking into account that in the catchment area of the analyzed hospital all road crash victims among children arrive first in the AECD, a minimal temporary supplementation of medical staff, especially during summer, is required. This is possible without human resources expenditure, but with the hospital board agreement, by asking one or two resident doctors from traumatology department to come in AECD, when necessary. In average, this means one call in three days, the consequence being an increased efficiency of emergency care in such cases.
- In order to design additional measures for child protection and road injuries prevention, it is necessary to record in the medical files the road user status in each road trauma case arriving in AECD.

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