

TO ASSESS THE FLUCTUATIONS IN THE INCIDENCE OF HEAD INJURIES IN PAEDIATRIC PATIENTS IN THE MEDICAL EMERGENCY TEAMS MATERIAL

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ABSTRACT

INTRODUCTION: Head injuries in children pose a serious challenge both in terms of the management and diagnostics. Due to technological progress and thus the development of motorization, despite the decreasing overall injury rate, the incidence of high-energy injuries increases. The aim of the study was to assess the frequency of intervention of emergency medical teams to paediatric patients due to head injuries.

METHODS: The study was a retrospective study. The material consisted of medical interventions of medical rescue teams from the regions of Piaseczno and Pruszków from the period 11.2016–10.2017. 422 medical emergency records were analyzed.

RESULTS: Median age of study group was 7.7 years (IQR; 3–12) — females 7.6 years (IQR; 2–13) and males 7.9 years (IQR; 4–12). The injuries occurred most frequently in March (n = 43; 11.8%), and least frequently in February (n = 22; 5.2%). The above relation occurred regardless of gender. Injuries occur most frequently in spring (n = 132; 31.3%), and least frequently in summer (n=88; 20.8%; Tab. 1). In the afternoon an increase in the incidence of injuries was observed. Differences in the incidence of injuries in the group of males and females depending on the time of day were not significantly statistical (p = 0.206). Superficial head injury was the most common injury (n = 122; 28.9%) followed by open head wounds in both males and females.

CONCLUSIONS: The most frequent head injuries were superficial head injuries followed by open head injuries. Injuries occurred more often on weekdays, less frequently at weekends. In the afternoon an increase in the incidence of injuries was observed. Injuries occur most frequently in spring and least frequently in summer on a monthly basis they occurred most frequently in March, and least frequently in February regardless of gender.

KEY WORDS: head injury, epidemiology, pediatric, emergency medical service

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INTRODUCTION

Head injuries are one of the main causes of death and neurological disorders. In Poland and worldwide, due to the increasing number of injuries,

especially high-energy injuries, they pose serious health and socio-economic problem [1, 2]. It should be noted that the highest mortality due to cranioc-

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rebral trauma is observed among newborns and older age groups [3, 4].

For pediatric patients, differences in anatomy between children and adults, including a relatively larger head, thinner skull bones, large subarachnoid space, as well as weaker neck muscles, should be taken into account. Head injuries include superficial injuries to the skin and the limbs of the skull as well as injuries to the central nervous system and injuries to vessels and cranial nerves.

Head injuries are a leading cause of death in the US in pediatric patients. Fortunately, the majority of head trauma in pediatric patients are mild however a few of them can present a life-threatening head injury with the severe neurological sequel. There were many schemas proposed to assess a head injury in pediatric patients. The primary and secondary survey can help to reveal a head injury in pediatric patients. There are many studies which can help to assess a pediatric patient with suspected head trauma including laboratory test and imaging studies including computed tomography, magnetic resonance imaging and also ultrasound examination. The aim of the study was to assess the frequency of intervention of emergency medical teams to pediatric patients due to head injuries.

METHODS

The study was a retrospective study. The material consisted of medical interventions of medical rescue teams from the regions of Piaseczno and Pruszków from the period 11.2016–10.2017. 422 medical emergency records of pediatric patients with head injury were analyzed.

RESULTS

The study analyzed 422 emergency medical record for pediatric trauma patients. The median age of the study group was 7.7 years (IQR; 3–12). The median age of females was 7.6 years (IQR; 2–13) and males 7.9 years (IQR; 4–12) (Fig. 1).

In the study group they occurred most frequently in March ($n = 43$; 11.8%), and least frequently in February ($n = 22$; 5.2%). The above relation occurred regardless of gender. A detailed annual summary of the incidence of injuries is presented in Table 1.

An additional analysis of the incidence of injuries in relation to the seasons showed that injuries occur

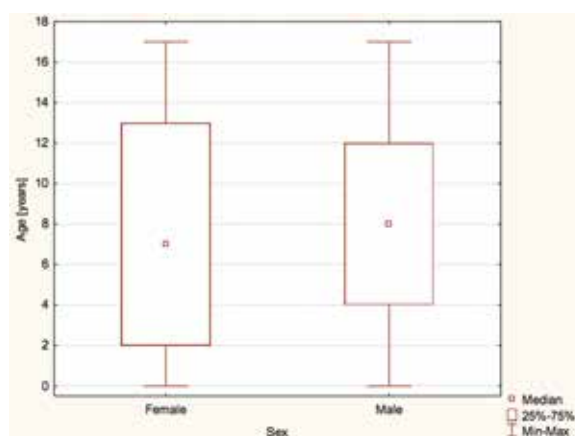


FIGURE 1. Median age of pediatric trauma patients

most frequently in spring ($n = 132$; 31.3%), and least frequently in summer ($n=88$; 20.8%; Tab. 1). The detailed graphical distribution of the incidence of injuries in relation to the seasons is presented in Figure 2.

The frequency of interventions in a daily cycle showed differentiation. In the afternoon an increase in the incidence of injuries was observed. Differences in the incidence of injuries in the group of males and females depending on the time of day were not significantly statistical ($p = 0.206$; Fig. 3).

„S00” - the superficial head injury was the most common injury. The following were open head wounds („S01”; $n = 122$; 28.9%; Tab. 1). This relationship concerned both males and females.

4. DISCUSSION

According to the analyzed material, head injuries in children are not a rare intervention of medical rescue teams in the examined region. Head injuries are an important diagnostic problem, especially in pediatric patients, who, due to their age, are not able to define the problem and clearly indicate what has actually happened. The study indicated similar age and gender parameters of children to those of other authors [5].

As a rule of thumb, every injury in the area and on the head, itself requires detailed and imaging hospital diagnostics due to possible injuries to the central nervous system, so the intervention of the medical rescue team is fully justified. It should be noted that there is no unambiguously defined notion of mild head trauma, and the criteria for the division of head injuries vary [6–11]. Observing the global trend, it can be observed in the publications

Table 1. Characteristics of patients						
Parameter	Total		Female		Male	
	Count	Percent	Count	Percent	Count	Percent
No of Patients	422	100%	144	34.1%	278	65.9%
Month						
January	43	10.2%	15	10.4%	28	10.1%
February	22	5.2%	5	3.5%	17	6.1%
March	50	11.8%	17	11.8%	33	11.9%
April	38	9.0%	10	6.9%	28	10.1%
May	44	10.4%	17	11.8%	27	9.7%
June	34	8.1%	10	6.9%	24	8.6%
July	22	5.2%	7	4.9%	15	5.4%
August	32	7.6%	16	11.1%	16	5.8%
September	31	7.3%	9	6.3%	22	7.9%
October	31	7.3%	12	8.3%	19	6.8%
November	32	7.6%	7	4.9%	25	8.9%
December	43	10.2%	19	13.1%	24	8.6%
Season						
Spring	132	31.3%	44	30.6%	88	31.6%
Summer	88	20.8%	77	22.9%	55	19.8%
Autumn	94	22.3%	105	19.4%	66	23.7%
Winter	108	25.6%	144	27.1%	69	24.7%
Day of the week						
Monday	58	13.7%	24	16.7%	34	12.2%
Tuesday	68	16.1%	19	13.2%	49	17.6%
Wednesday	63	14.9%	20	13.9%	43	15.5%
Thursday	70	16.6%	22	15.2%	48	17.3%
Friday	69	16.4%	26	18.1%	43	15.5%
Saturday	47	11.1%	15	10.4%	32	11.5%
Sunday	47	11.1%	18	12.5%	29	10.4%
Clinical diagnosis						
S00	263	63.3%	102	70.8%	161	57.9%
S01	122	28.9%	31	21.5%	91	32.7%
S02	3	0.7%	0	0%	3	1.1%
S03	0	0%	0	0%	0	0%
S04	0	0%	0	0%	0	0%
S05	4	0.9%	1	0.7%	3	1.1%
S06	5	1.2%	2	1.4%	3	1.1%
S07	0	0%	0	0%	0	0%
S08	0	0%	0	0%	0	0%
S09	25	5.9%	8	5.5%	17	6.1%

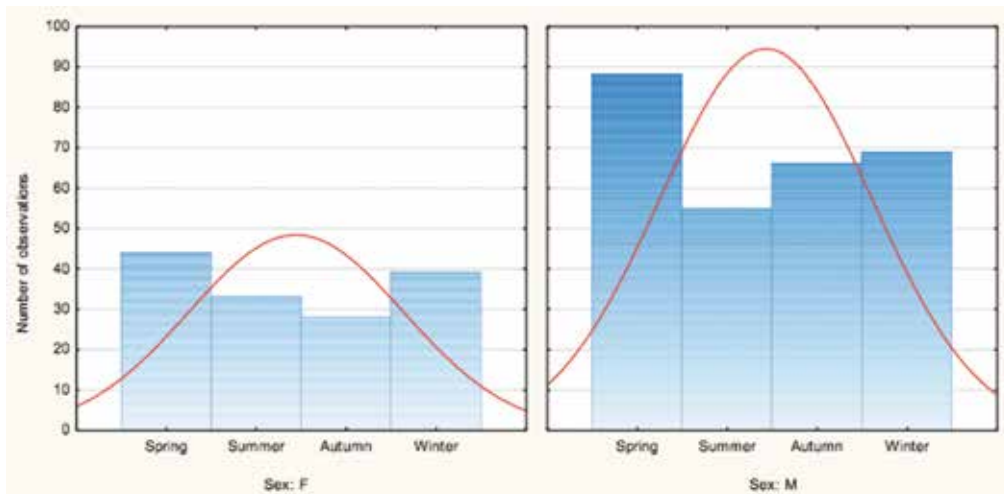


FIGURE 2. The season distribution of the frequency of injuries in the group of girls and boys

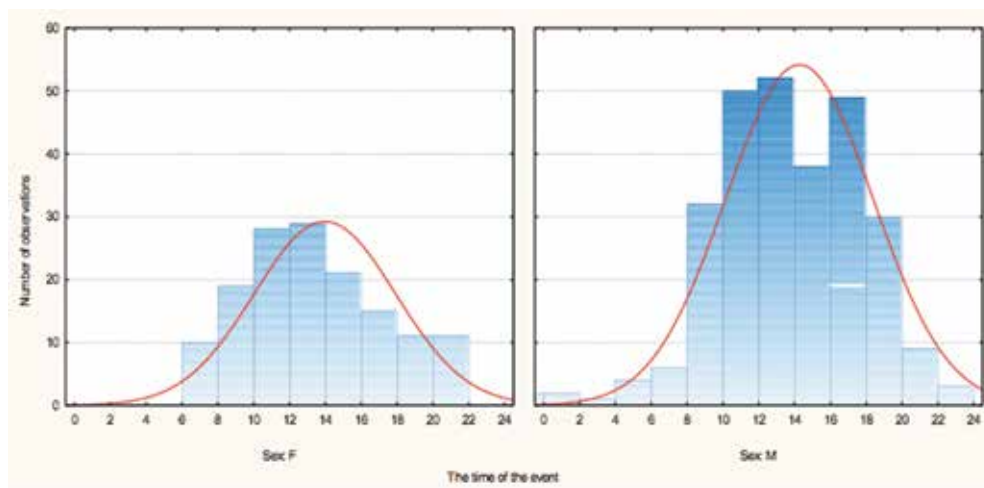


FIGURE 3. The daily distribution of the frequency of injuries in the group of girls and boys

of researchers around the world that the number of head injuries in pediatric patients due to trauma increases every year, and the mechanism in children aged 1–4 years is most often related to falls [12].

The study material analyzed 422 medical emergency records and showed that the most frequent head injuries were superficial head injuries as well as open head injuries. The specificity of these injuries requires not only the care of the wound itself but because of the possible consequences for the brain structures, as well as diagnostics within the emergency department. The position of the Polish Children's Surgeons' Society clearly indicates that diagnostic procedures with a child with severe or moderate head trauma should be unequivocal: hospitalization, imaging — computed tomography, neurological and ophthalmolo-

gist's examination. The above division was based on the GCS scale, where criteria were adopted, which also took into account its modification for small children; head injuries are divided into mild (15–13 points), moderate (12–9 points) and severe (8 and below 8 points [13].

It is extremely difficult to take care of a child who has suffered head trauma and requires the emergency medical personnel to acquire comprehensive knowledge. The age of the child, the severity of the injury and the duration of the unconsciousness must always be considered. As a rule, complaints after injuries in the skull withdraw slowly. In connection with emerging scientific publications, which mention the following possibility of detecting cranial hemorrhage by means of a portable near-infrared spectroscopy in children over 3 years of age who

meet the eligibility criteria, infrascanner examination for the diagnosis of minor and moderate head injuries should be considered [14–17]. Therefore, it seems justified to equip medical rescue teams with appropriate equipment. However, it should be remembered that medical personnel has a fundamental duty in pre-hospital management in order to seek, as far as possible, detailed knowledge of the injury mechanism, which is essential for further proceedings [18]. Due to anatomical differences and different experience of medical personnel, it is also important to create trauma centers for children, i.e., associating pediatric specialists in one place so that diagnostics and treatment can be started in a specific group of patients, i.e., children, especially trauma patients.

Studies by Zaman et al. have shown that in small children, already in superficial injuries of soft tissues of the head, skull bones can be injured, as well as post-traumatic hemorrhage can occur. In addition, the study suggests that computed tomography of the head should also be performed routinely in children with soft tissue injuries < 5 cm, and in children aged 1 to 3 years if the diagnosis of cranial fracture would change the rescue procedure to the fullest extent within the further management [19].

Head injury among children is one of the most common causes of death and disability in the United States, and more and more often this trend is observed all over the world, and therefore there is a need for further research aimed at effective management, which will focus on diagnosis, pre-hospital management, appropriate diagnostics and efficient and effective treatment [20]. Taking care of a small child is not irrelevant in this respect. Studies by Wagas et al. clearly indicate that the majority of head injuries in small children occur at home, and the reason for their occurrence is the lack of supervision by the caregiver, and thus, to a large extent, these head injuries could have been prevented, starting with the education of parents or caregivers [21].

5. CONCLUSIONS

The most frequent head injuries were superficial head injuries followed by open head injuries. Injuries occurred more often on weekdays, less frequently at weekends. In the afternoon an increase in the incidence of injuries was observed. Injuries occur most frequently in spring and least frequently in summer

on a monthly basis they occurred most frequently in March, and least frequently in February regardless of gender.

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