

Profile of accidents in children and adolescents receiving care at a public hospital

Perfil dos acidentes na infância e adolescência atendidos em um hospital público

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Abstract

Objective: To analyze the occurrence of accidents in a pediatric emergency room at a public hospital.

Methods: This was a cross-sectional, descriptive, and correlational study on the occurrence of accidents among children and adolescents identified during care delivery in a pediatric emergency room in the municipality of *São José dos Campos*. The initial sample included 2440 recorded cases, but the sample size was reduced to 2,421 because 16 cases were suspected of a violent cause and 3 cases were missing data. The data collection instrument was completed by data registration in the unit using a care form. Data were collected from September 01 to December 31, 2013. Inclusion criteria were children and adolescents aged 0 to 13 years with an accident-related admission to the emergency room at the hospital where the study was carried out. We excluded those who were assisted in the emergency room for any other reason during the study period.

Results: Accidents corresponded to 12.1% of instances of care delivered. A majority occurred in boys (62.5%); participants' ages ranged from 0 to 13 years (33.6%). Falls were the most frequent type of accident (48.7%). The body part most affected in children up to 1 year of age was cephalic/neck (75.0%); among adolescents, the most affected body parts were the upper limbs and lower limbs (approximately 30% occurrence). Main in-hospital procedures were radiography (67.6%), evaluation by a specialist (52.7%), and orthopedic splinting (25.9%). Discharge was the most common endpoint (84.0%), followed by observation (10.5%), hospitalization (4.2%), and death (one patient). **Conclusion:** Accidents had a higher incidence and had an impact on the population and health sector of the municipality, including an increase in the number of instances of care and, consequently, in cost, in addition to the incalculable emotional impact.

Resumo

Objetivo: Analisar as ocorrências de acidentes atendidos no pronto-socorro pediátrico de um hospital público.

Métodos: Trata-se de uma pesquisa transversal, descritiva e correlacional sobre a ocorrência de acidentes em crianças e adolescentes, identificados no momento do atendimento em um pronto-socorro pediátrico no Município de São José dos Campos. A amostra inicial foi de 2.440 registros de atendimentos, mas foi reduzida para 2.421, porque em 16 casos houve a suspeita de violência e em três não foi possível localizar os dados. O preenchimento do instrumento de coleta de dados foi realizado por meio de dados registrados na ficha de atendimento da unidade. O período de coleta foi de 01 de setembro a 31 de dezembro de 2013. Os critérios de inclusão foram: ser criança ou adolescente de 0 a 13 anos de idade; ser atendidos por acidentes, no pronto-atendimento do referido hospital no período do estudo. O critério de exclusão foi ter sido atendido no referido pronto-atendimento devido a outras causas no período do estudo.

Resultados: Os acidentes corresponderam a 12,1% do atendimento; predominância do sexo masculino (62,5%); faixa etária mais acometida foi a de 0 a 13 (33,6%). O tipo de acidente mais frequente foi queda (48,7%). A parte do corpo acometida, em crianças de até um ano, foi o segmento céfalico/pescoço (75,0%), nos adolescentes, foram membros superiores (MMSS) e inferiores (MMII) com aproximadamente 30,0%. Os principais procedimentos intra-hospitalares foram: Raio-X (67,6%), avaliação de especialista (52,7%); imobilização ortopédica (25,9%). Alta foi o desfecho mais ocorrido (84,0%), seguido por observação (10,5%), internação (4,2%) e um óbito.

Conclusão: Acidentes tiveram alta incidência, acarretando impacto para a população e setor saúde, incluindo elevação do número de atendimentos e, por consequência, do custo, além de incalculáveis reflexos emocionais.

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Introduction

Accidents in childhood and adolescence have been implicated as responsible for an increase in morbidity and mortality rates in this population worldwide. In 2007, the U.S. nongovernmental organization Safe Kids stated that a mean of 12 children are harmed per minute. Every 101 minutes, a child dies from these injuries; for this reason, such accidents are considered the main cause of death and disability in individuals aged 1 to 14 years.⁽¹⁾

In Brazil, the rate of accidents has increased, and accidents have become a serious public health problem. In 2013, according to preliminary data from the Information System on Mortality (SIM), 75,685 deaths occurred among population aged 0 to 19 years. Of these, 21,859 deaths (28.88%) were related to external causes, and among them 7,520 (34.4%) were caused by accidents.⁽²⁾ Concerning morbidity, from January to September 2015, accidents were responsible to 170,066 hospitalizations of individuals aged 0 to 19 years.⁽³⁾

In 2001, the Brazilian Ministry of Health created a national policy for reduction of accidents and violence. One of the main goals is to reduce morbidity and mortality rates by using articulated and systematized actions related to the promotion and prevention of such events.⁽⁴⁾ After 16 years of implementation of this policy⁽⁴⁾, the impact of this disease has improved and the visibility of strategies for prevention and control has been amplified.

Another important measure was to diffuse the concept, adopted by the scientific community, that accidents are predictable and can be prevented and thereby to strengthen the knowledge of researchers on factors associated with risk for and protection against accidents.

An accident is defined as a series of unintentional events in a short period of time in which an external agent causes an imbalance, leading to the transfer of energy of the environment to the individual and physical, material and/or physical damages. This energy can be mechanical (falls,

collisions), thermic (burns), electric (shocks) or chemical (poisoning).⁽⁵⁾

Understanding how the context of accidents allows the opportunity to analyze how accidents present in specific population and how they are dimensioned would help in the allocation of funding for direct specific actions to prevent or reduce this disease damage.

This study analyzed the occurrence of accidents in children and adolescents assisted at the pediatric emergency room at a public hospital in the municipality of São José dos Campos, São Paulo.

Methods

This cross-sectional, descriptive, correlational study evaluated the occurrence of accidents in children and adolescents at a pediatric emergency room in the municipality of São José dos Campos.

The initial sample consisted of medical records from 2440 instances of care, but it was reduced to 2421 because 16 cases were suspected of being caused by violence and three were missing data. The data collection instrument was completed by with registered records using an assistance form from the unit.

Data were collected from September 1 to December 21, 2013. Inclusion criteria were children and adolescents aged 0 to 13 years who were admitted because of an accidents and assisted at the emergency room of the specific hospital during the study period. Patients were excluded if they were assisted in the emergency room because of other causes during the study period.

This study followed ethical principles of resolution no. 466/12 from the National Council of Health.⁽⁶⁾ The ethical and research committee of Universidade Federal de São Paulo approved the study under no. 319.241 in July/2013.

Results

A majority of patients seen were male (1512 cases [62.5%]); 909 females were seen (37.5%). Falls

were the most frequent accident (48.7%), followed by accidents caused by contact with objects (16.5%) and unidentified accidents with undefined injuries (10.6%).

Accidents seen more frequently in males were animal bites (77.7%), being run over by moving vehicle (75.0%), environmental poisoning (72.7%), physical shocks (72.2%), stings (66.7%), unidentified accident with undefined injury (65.4%), contact with objects (65.0%), falls (60.9%), foreign body ingestion (56.1%), collision (54.3%), and unidentified accident with sprain injury (53.3%).

Table 1 shows that burns (50.0%), poisoning (66.7%), swallowing or introduction of a foreign body (55.3%), and other accidents (62.9%) occurred mainly in individuals aged 1 to 4 years. In contrast, falls (27.4%), physical shock (44.4%),

animal bites (38.4%), and stings (50.0%) were more common among children aged 5 to 9 years.

Among children younger than 1 year and those aged 1 to 4 years (Table 2), the majority had affected cephalic segment, corresponding to 75.0% and 34.0%, respectively. Upper and lower limbs were more affected in children aged 5 to 9 years (28.2% and 23.6%) and adolescents aged 10 to 13 years (35.7% and 30.8%), respectively.

Total number of procedure done in the hospital because of accidents was 4,230, corresponding to 1.75 procedures per child. Most procedures consisted of radiographic examinations (n=1527) and specialist evaluation (n=1191), followed by orthopedic splinting (n=584), computed tomography (n=237), dressing or suturing (n=193), symptomatic prescription (n=104), administration of saline solution and/or vaccine

Table 1. Children and adolescents who sustained accidents and received care at H.M.J.C.F by age range and type of accident

Type of accident	Age range n (%)				Total
	0 to 1 year	1 to 5 years	5 to 10 years	10 to 14 years	
Contact with object	5(1.3)	95(23.8)	140(35.0)	160(40.0)	400(100.0)
Burns	-	11(50.0)	5(22.7)	6(27.3)	22(100.0)
Poisoning	1(3.0)	22(66.7)	4(12.1)	6(18.2)	33(100.0)
Fall	119(10.1)	323(27.4)	387(32.9)	349(29.6)	1178(100.0)
Physical shock	-	5(27.8)	8(44.4)	5(27.8)	18(100.0)
Animal bites	2(1.9)	35(34.0)	40(38.8)	26(25.2)	103(100.0)
Stings	-	4(33.3)	6(50.0)	2(16.7)	12(100.0)
Swallowing or introduction of foreign body	2(1.8)	63(55.3)	38(33.3)	11(9.6)	114(100.0)
Collision	5(10.9)	9(19.6)	15(32.6)	17(37.0)	46(100.0)
Being run over	-	12(25.0)	13(27.1)	23(47.9)	48(100.0)
Unidentified accident/ sprain injury	-	20(16.7)	32(26.7)	68(56.7)	120(100.0)
Unidentified accident / undefined injury [†]	4(1.6)	40(15.6)	82(31.9)	131(51.0)	257(100.0)
Other accidents [‡]	10(14.3)	44(62.9)	7(10.0)	9(12.9)	70(100.0)
Total	148(6.1)	683(28.2)	777(32.1)	813(33.6)	2421(100.0)

[†]Case with trauma diagnosis without defined injury because of unidentified accident; [‡]33 cases in which an object fell on the child and 37 cases of painful pronation

Table 2. Children and adolescents who sustained accidents and were assisted at Hospital MJCF by age range, according to affected part of body

Affected part of the body	Age range – n(%)				Total (n=2,421)	p-value [*]
	0 to 1 year (n= 148)	1 to 5 years (n=683)	5 to 10 years (n=777)	10 to 14 years (n=813)		
Cephalic segment and neck	111(75.0)	232(34.0)	166(21.4)	72(8.9)	581(24)	< 0.001
Upper limbs	18(12.2)	140(20.5)	219(28.2)	290(35.7)	667(27.6)	< 0.001
Lower limbs	4(2.7)	91(13.3)	183(23.6)	250(30.8)	528(21.8)	< 0.001
Hip	2(1.4)	6(0.9)	14(1.8)	14(1.7)	36(1.5)	0.461
Thorax	2(1.4)	4(0.6)	14(1.8)	11(1.4)	31(1.3)	0.229
Multiple regions of the body	1(0.7)	11(1.6)	20(2.6)	17(2.1)	49(2)	0.369
No information	9(6.1)	124(18.2)	147(18.9)	161(19.8)	441(18.2)	0.001

^{*}Descriptive level of chi-squared test

Table 3. Children and adolescents who sustained accidents and received care at Hospital MJCF according to assistance progress and type of accident

Type of accident	Progress n(%)							Total
	High	Pediatric observation	Hospitalized at ICU	Hospitalized in pediatric nurse ward	Death	Evasion	Transferred	
Contact with object	383(95.8)	9(2.3)	-	7(1.8)	-	1(0.3)	-	400(100.0)
Burns	20(90.9)	-	-	2(9.1)	-	-	-	22(100.0)
Environmental poisoning	18(54.5)	12(36.4)	2(6.1)	1(3.0)	-	-	-	33(100.0)
Fall	936(79.5)	167(14.2)	4(0.3)	61(5.2)	-	9(0.8)	1(0.1)	1178(100.0)
Physical shock	15(83.3)	2(11.1)	-	1(5.6)	-	-	-	18(100.0)
Animal bites	100(91.1)	2(1.9)	-	1(1.0)	-	-	-	103(100.0)
Stings	8(66.7)	4(33.3)	-	-	-	-	-	12(100.0)
Foreign body†	87(76.3)	10(8.8)	-	16(14.0)	-	1(0.9)	-	114(100.0)
Collision	14(30.4)	28(60.9)	-	3(6.5)	1(2.2)	-	-	46(100.0)
Being run over	22(45.8)	16(33.3)	3(6.3)	7(14.6)	-	-	-	48(100.0)
Unidentified accident‡	118(98.3)	-	-	-	-	2(1.7)	-	120(100.0)
Unidentified accident§	252(98.1)	1(0.4)	-	1(0.4)	-	3(1.2)	-	257(100.0)
Other accidents¶	60(85.7)	4(5.7)	2(2.9)	2(2.9)	-	2(2.9)	-	-
Total	2.033(84.00)	255(10.5)	11(0.5)	102(4.2)	1(0.0)	18(0.7)	1(0.0)	2421(100.0)

†swallow or introduction of foreign body; ‡sprain injury; §with non-defined injury; ¶33 cases of object fall over the child and 37 cases of painful pronation

(n=110), surgical intervention (n=91) and advises (n=21).

Table 3 shows that the following cases were under surveillance: 36.4% of environmental poisoning, 60.9% of collision occurrences, 33.3% of runover cases, and 14.2% of falls. We also observed that only 4.2% of children remained hospitalized (in a nurse ward) and 0.5% were referred to intensive care therapy. One 6-year-old child who was a traffic accident victim died.

Discussion

In the past few decades, achievements related to health promotion to children have been reported, and these improvements are reflected in the reduction of child mortality. In relation to accidents, part of these occurrences, is considered integrating fact of life and concerning development in all spheres of the society.⁽⁷⁾

The results of this study revealed that seeking emergency care because of an accidents during childhood and adolescence is significant, accounting for 12.1% of all instances of care provided in a reference hospital of the region. This value is important mainly because most accidents are avoidable and force institutions to divert time, person-

nel resources and considerable funding away from other causes.

In the analysis according to sex, a predominance of males was seen, with a ratio of 1.66 boys for each girl. This result agrees with the report from VIVA/MS concerning the emergency assistance because of accidents with children younger than 10 years, and this predominance of males totaled 59.4%.⁽⁸⁾

The higher number of males can be explained by the types of activities boys may engage in more frequently, including those involving speed, strength, and body impact. For this reason, boys traditionally may be exposed to situations that can lead to accidents. Another possibility is that girls traditionally may be more likely to participate more introspective activities and games that require less energy and exposed them to closer vigilance, thereby reducing the risks of accidents.⁽⁸⁾ Despite these possible explanations, it is important to emphasize that no rules exist to determine which games each sex participates in; play involves fantasy, and this is the way in which children interact with each other and is essential for healthy development.

The mean age of patients experiencing an accidents was 7.2 years, with a standard deviation of 4.2 years, and median of 7.5 years. In this study, the age range most affected was 10 to 13 years (33.6%), fol-

lowed by 5 to 9 years (32.1%), 1 to 4 years (28.2%), and younger than 1 year (6.1%).

In a retrospective study carried out in the municipality of Ribeirão Preto (2008) among children and adolescents, the group aged 15 to 19 years (37.1%) had the most accidents, followed by the groups aged 5 to 9 years (24.4%), 10 to 14 years (23%), 1 to 4 years (13.9%), and younger than 1 year (1.6%). Thus, we observed a concordance of results only in the less affected age range.⁽⁹⁾

In our study, falls were the most frequent type of accident (48.7%). Falls are the main mechanisms of trauma and are important because of variety of injuries that can cause small traumas and even death.⁽¹⁰⁾

Data from the VIVA/MS report in the region of Campinas in 2009 stated that most instances of care provided by an emergency service are falls, representing 35.8%.⁽¹¹⁾

In relation to accidents caused by contact with an objects, the most affected age range was 10 to 13 years (40.0%), followed by 5 to 9 years (35.0%), from 1 to 5 years (23.8%), and younger than 1 year (1.3%). The predominance of adolescence affected by this type of accident can be related to adolescents' desire for autonomy yet lack of dexterity, such as an inability to properly handle sharp objects, and their difficulty ascertaining risk.

The severity of accidents caused by swallowing a foreign body is related to the type of object, the location of the object in the body, and age of the child. When the object is located in the respiratory tract, such accidents are potentially severe, because of the risk of asphyxia. The younger the child, the lower the caliber of the airways, which increases the chance of total obstruction.

Accidents caused swallowing a foreign body occur mainly in individuals aged 1 to 4 years (55.3%), followed by 5 to 9 years (33.3%), 10 to 13 years (9.6%), and younger than 1 year (1.8%). These data are similar to those found in a study in the municipality of São Luís (MA); predominance is 81.9% in the age range of 1 to 3 years.⁽¹²⁾

Animal bites occurred mainly among males (77.7%) and in the age range of 5 to 9 years (38.8%). This occurrence can be explained by the fact that boys may more frequently be permitted

greater liberty and often engage in more hostile games with animals, in addition to a lack of perception of risk and lack of knowledge of aggressiveness of the animal.

Because of younger children's small stature and less intense physical contact of child with an animal, animal bites are more likely to affect the face and neck, thereby increasing the severity of this accident. Results found in this study differ from data on admission for bites from dogs/other mammals in 2013 from DataSUS, in which the most affected age range was 1 to 4 years.⁽²⁾

Traffic accidents (being run over by a car) occur with higher frequency in the population aged 10 to 13 years (47.9%), followed by 5 to 9 years (27.1%) and 1 to 4 years (25.0%). These data agree with research done in 2011, revealing that 28.6% of admissions for traffic accidents occurred in the age range of 15 to 19 years, 27.38% for 10 to 14 years, and 27.84% for 5 to 9 years.⁽¹³⁾

The fact that the most affected age range was 10 to 14 years can be related to the desire for autonomy, whereby children/adolescents will tend to walk alone on the street. It is important to highlight that presence of such factors as difficulty calculating time/velocity of a car and participating in race games with friends along busy avenues favor these accidents.

However, children younger than 10 years are vulnerable to being run over because of their own characteristics, such as difficulty precisely locating sounds and speed of vehicles, partial peripheral vision, short stature, and distractible behavior. These characteristics, along with curiosity and difficulty making rapid decisions, make these children more vulnerable to this type of accident.^(7,14)

We observed that poisoning occurred predominantly in the age range of 1 to 4 years (66.7%), agreeing with a retrospective study done in a Hospital in Maringá (PR) in 2008 among children and adolescents, which found that 78.5% of these events occurred in this age range.⁽¹⁵⁾

In 2007, another study carried out in the municipality of São Paulo (SP) found that in this municipality there was easy access to different substances, such as medications (79.8%) and cleaning materi-

als (86.1%). Storage was also seen as inadequate in 80% of cases.⁽¹⁶⁾

Culturally, society has been suffering a medicalization process; consumption of medicine is expanding and medications are easily stored at home. For this reason, they present great risk. Another factor is that some adults, when administering medications to a child, erroneously tell the child the medicine “is yummy” to encourage the child’s acceptance; this may lead a child to make this association upon seeing a medication and therefore improperly ingest it.

Male sex was also more prominent in terms of environmental poisoning (72.7%). These data agree with those found in the literature, although the differences are lower. In 2011, the National System of Toxic-Pharmacological Information in Brazil recorded 105,875 cases of environmental poisoning in the general population; 50.53% of cases were in men and 48.91% were in women.⁽¹⁷⁾

According to the report of the American Association of Poisoning Control Center in 2012, a predominance of boys younger than 13 years was observed, but in adolescents and adults, the majority were women.⁽¹⁸⁾ Analysis of this statistic suggests intentionality of this poisoning. In a study published in 2005 that included adolescents who received care in the emergency unit with a diagnosis of suicide in Ribeirao Preto (SP), 77.8% of patients were women; of these, 75% had swallowed medicines.⁽¹⁹⁾

Burns are other type of accident and are responsible for 0.9% of cases. In this study the occurrence of burns was low, and we believe this because burn patients are referred to another center for treatment.

Burns in our study affected those aged 1 to 4 years (50.05), followed by 10 to 14 years (27.3%) and 5 to 9 years (22.7%). This predominance is almost entirely related to free access to the home kitchen. Accidents occurred both for boiling liquids and contact with hot surfaces.

It is important to highlight in relation to burns that the younger the child, the greater the severity, because burns can affect a large body surface in relation to weight; it may result in loss of liquid of intravascular tissue. In addition, because skin layers are thinner, it might worsen the clinical picture and can compromise prognosis.⁽⁷⁾

In children younger than 1 year, a number of accidents occurred in the segment skull/neck (75.0%) ($p < 0.001$). In this age range, the head dimensions are disproportionate to the other parts of the body, thereby facilitating injuries in this body segment.

However, for accidents that affect MMSS and MMII (above 30%), we observed a higher percentage in this age range of 10 to 13 years. This result can also be seen in a study with children and adolescents aged 0 to 19 years who were assisted at emergency and urgent services, affecting MMSS (34.4%) followed by MMII (30.2%) and lastly the face/head (17.9%).⁽²⁰⁾

Procedures done in this study revealed that less than half of patients (52.7%) had to be assessed by a specialist; 67.6% and 10.5% underwent radiography and computed tomography, respectively. Almost one fourth of children who participated in the study had orthopedic splinting as the prescribed treatment.

A 2000 study on expenses of the Brazilian Public Health System with hospitalizations due to external causes showed that most of expenses were due to natural causes. Although such patients stay for a shorter time in the hospital, costs rise, especially because of the need for diagnostic procedures, such as imaging, and/or surgery.⁽²¹⁾

In our study, we observed that 10.5% of cases had as an endpoint hospitalization in the pediatric observation unit, 4.2% of patients were hospitalized in a nurse ward, and 0.5% were hospitalized in the intensive care unit. Therefore, the analysis of procedures adopted and results suggests that accidents have a high impact in terms of direct cost for medical/hospital care in Brazil; our study, however, did not directly measure costs. Therefore, we observed that costs increase and overloading of the public sector with expenses should be avoided.

Of 11 children (0.5%) who needed intensive treatment and care, 36.3% had sustained a fall, 27.2% were run over, 18.1% had environmental poisoning, and 18.1% had experienced other accidents. However, more children who had swallowing or introduced a foreign body and were run over were hospitalized in the nurse ward or intensive care unit (over 14%), compared with those who experienced other accidents.

Children younger than 1 year of age had longer lengths of stay in the pediatric observation unit (38.6%) whereas more of those aged 10 to 13 years were discharged (90.2%).

Discharge was the most frequent outcome (84.0%), showing that accidents in childhood and adolescence were less complex and less severe in the study population, considering the solubility in medical consultation or receiving continuity of treatment in domestic environment. This fact can reduce the importance of sequelae possibility, therefore compromising the phase of plan development.

Based on results found, we confirm that accidents are complex phenomena and must be analyzed both individually by a search for occurrences and facts related to each case and collectively in existing risk situations of each age range or even in specific groups.

Conclusion

Accidents had a high incidence in the studied municipality. Data enabled a greater understanding of risk factors, causes and consequences of accidents in children and adolescents contributing to implement future actions and strategies to prevent these events. In addition, accidents had a great impact in the studied population and in the municipality health sector, including an increase in the number of instances of care, and consequently, costs, in addition to incalculable emotional effects. It is important to highlight that during the care of children and adolescents who have sustained an accidents, the professional should be attentive to the possibility of determining whether the injury was intentional or due to negligence. The nurse and other health professionals who work with children and adolescents should participate actively in accident preventions and also assign this problem the same priority level as other issues that involve the healthy development of this population.

Collaborations

Filócomo FRF, Harada MJCS, Mantovani R, Ohara CVS declare to contribute to elaboration of the

Project, data collection, analysis and interpretation of data, drafting the manuscript, they also contributed to the content of the articles after its critical review, and approved the final version of the paper to be published.

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