Emergency department visits for nonfatal childhood injuries in Romania

Florin Oprescu[a,c,d], Corinne Peek-Asa[d,e], Tracy Young[e], Ioan Figan[b] and Dan Nour[b]

Background **Childhood injury rates are higher in low and middle-income countries than in high-income countries. Childhood injuries have not been widely studied in Romania, a middle-income country, because data sources are lacking.**

Objective **This study presents the first surveillance data of nonfatal childhood injuries from a large children's hospital in Cluj, a major city of Romania.**

Methods **This retrospective study included review of medical records of injured children of 0–18 years of age treated in a major city pediatric emergency department from 1999 to 2003.**

Results **In the 5-year study period, 1179 childhood injuries were treated in the emergency department, for an average of 236 patients per year. For the county of Cluj, this represents an annual average injury incidence of 197 per 100 000 children younger than 5 years, 140 per 100 000 children aged 5–14 years, and 135 per 100 000 for children aged 15–18 years. Unintentional injuries represented 77.8% of cases, 18% were self-harm and suicide attempts, and 4.3% were assaults.**

Conclusion **These trends, among the first reported from Romania, can help identify priority prevention areas.** ***European Journal of Emergency Medicine*** **15:268–275 © 2008 Wolters Kluwer Health | Lippincott Williams & Wilkins.**

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[a]Center for Health Policy and Public Health, Institute for Social Research University Babes-Bolyai, [b]Children's Clinical Hospital, Cluj, Romania, [c]Department of Community and Behavioral Health, University of Iowa, [d]Department of Occupational and Environmental Health, University of Iowa Fogarty Traumatic Injury Training Program and [e]Department of Occupational and Environmental Health, University of Iowa Injury Prevention Research Center, College of Public Health, Iowa City, Iowa, USA

Correspondence to Corinne Peek-Asa, 100 Oakdale Blvd #114 IREH, Iowa City, IA 52242, USA
Tel: +1 319 335 4895; fax: +1 319 335 4225;
e-mail: corinne-peek-asa@uiowa.edu

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Introduction

Childhood injuries are well documented as a major public health problem in developed countries such as the United States [1–5] and in western Europe [6–8]. A recent study reported that people in low-to-middle income European countries, which include Romania, have injury death rates 3.6 times higher than their high-income counterparts, and the disparity is increasing [9].

In addition to being the leading cause of death for those younger than 18 years [2,6,8,10–12], injuries result in disabilities and long-term sequelae [13,14] that can include physical, psychological, and financial hardships [15]. Injuries also strain the health care system; they are a frequent cause of emergency room visits, hospitalizations, and long-term care, and represent a costly burden on health care systems [16–18]. As a result of these consequences, preventing childhood injury is a public health priority.

Romania ranks sixth among European countries in childhood injury death rates: each year 30 per 100 000 children aged between 1 and 14 years die from an injury. In comparison, fewer than seven children per 100 000 die from injuries in Sweden, the United Kingdom, Italy, and The Netherlands [19,20]. Most of these deaths are preventable through effective surveillance and appropriate public health interventions. Many European countries have successfully reduced their childhood injury death rates through focused intervention efforts [20].

Data on childhood injuries in Romania is very limited, even though such information is needed to help inform prevention efforts. The few existing studies have examined specific injury types in clinical series, including ocular injuries; [21–23] ear, nose, and throat injuries; [24] burns [25]; and traffic crashes [26,27]. Reasons for lack of information on childhood injuries in Romania are many, but several key factors hinder progress. First, injuries are not considered a major public health problem, as are infectious diseases or nutrition [28]. Second, no agency or groups of professionals have taken ownership of injury prevention or championed issues related to injury

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prevention [29]. Third, the public health system is underdeveloped and underfunded [28], and the consumer safety movement is just beginning. Legislation on safety is far from comprehensive and effective. Fourth, the financial resources allocated to health in general and public health in particular are small (a general situation for many central and eastern European countries). The 1997–1999 average development assistance for the Romanian health system from 1997 to 1999 was 0.01 USD (one US cent) per capita [30]. This is about 400 000 times less than the $US 4178 average health care spending per capita in the United States in 1998 [31].

Even in these grim conditions, there are some low cost initial steps that could lay the necessary basis for future interventions designed to reduce the rate of injuries and of young life losses. Following the concept, 'think globally, act locally', this paper presents the results obtained by piloting a basic trauma registry in a major Romanian pediatric emergency department. In the near future, with the advent of electronic medical records, such an initiative could be easily replicated on a much larger scale. This may provide a model for a much needed injury surveillance mechanism in countries with limited resources.

Materials and methods

Data and study design

The present study is a retrospective review of pediatric injuries treated in a major inner city pediatric emergency department in Cluj Napoca, a major city in Romania. Pediatric injuries were reviewed for the 5-year period from 1999 to 2003. The emergency department was the major triage unit for pediatric emergencies throughout the county. With few exceptions, most pediatric emergencies in the city and surrounding rural areas were received in this unit, treated, and directed as necessary to other medical units.

During the study period, only a few of the emergency department medical records were available electronically, and the patient log information was too limited to identify injury visits. Thus, all hardcopy medical records from 1 January 1999 to 31 December 2003 were reviewed by a team of three local physicians to decide if they met the study inclusion criteria. Records of children aged 0–18 years who were treated for an acute injury were included. Medical records without an indication of injury at the time of admission were not reviewed. Acute injury was defined based on WHO criteria as follows: 'an injury is the physical damage that results when a human body is suddenly or briefly subjected to intolerable levels of energy. It can be a bodily lesion resulting from acute exposure to energy in amounts that exceed the threshold of physiological tolerance, or it can be an impairment of function resulting from a lack of one or more vital elements (i.e. air, water, warmth), as in drowning, strangulation, or freezing' [31].

Data from the medical records were collected, coded, and entered in an electronic database by three local physicians trained in study definitions and code assignments. The injury diagnosis and cause of injury were coded using International Classification of Diseases 10 [32]. To increase reliability, all three coders used a special software program that linked diagnoses and cause of injury with the appropriate International Classification of Diseases 10 codes [33]. A data entry form and Microsoft Access compatible database for data storage were created using EpiInfo Software, version 3.3.2 (Centers for Disease Control and Prevention, Atlanta, Georgia, USA) [34]. Automated checks in the entry form were used to limit data entry errors. The primary investigator checked the coding and database for accuracy.

Permission was obtained for a record review from the director of the hospital and the study analysis methodology was approved by the Institutional Review Board at the University of Iowa.

Study variables

Data elements used in our analyses included sex, age, ethnicity, place of occurrence, injury diagnoses, nature of injury, injury intent, length of stay, and disposition. Age was categorized into three groups (< 5, 5–14, and 15–18 years). Within the external cause of injury information, poisonings were classified as toxic effects of carbon monoxide, alcohol, chemicals, and medication. All injuries were classified as intentional or unintentional. Within intentional injury self-harm was differentiated from suicide attempts. Self-harm was defined as behaviors such as self-cutting or poisoning (including alcohol), which usually did not have known suicidal intent, although these injuries pose a risk of death. Cases that indicated a known suicide attempt (e.g. verification from a note, intentional medication overdose or combination of substances with known lethal effects) were classified as suicide. Discharge from the emergency department was classified as home or admission into a hospital.

Statistical analyses

The distribution of pediatric patients by injury intent (i.e. unintentional, assault, self-harm, and suicide attempt) was examined by sex, age, ethnicity, place of injury occurrence, nature of injury, and disposition.

Crude odds ratios and 95% confidence limits were estimated using a univariate logistic regression procedure to identify increased odds for injury by intent, sex, age, and place of injury occurrence. Chi-square tests were used to determine if the distribution of injury intent and injury mechanism varied by age stratified by sex.

Chi-square tests were used to determine if the distribution of sex, age, injury intent, and injury mechanism varied by disposition. Statistical significance for the χ^2 tests was set at $P < 0.05$. The data were analyzed using SAS statistical software (SAS Institute, Cary, North Carolina, USA) [35].

Results

In the 5-year study period, 1179 childhood injuries were treated in the emergency department, for an average of 236 patients per year. For the county of Cluj, this represents an annual average injury incidence of 197 per 100 000 children younger than 5 years, 140 per 100 000 children aged 5–14 years, and 135 per 100 000 for children aged 15–18 years.

The majority, 71.5%, of the patients arrived by ambulance, with 19% who arrived by private car, and 9.5% by other means. While 60% of the patients spent less than 8 h in the emergency department, 40% spent more than 8 h before referral to another medical unit or discharged home. The maximum length of stay was 48 h. The distribution of injuries by ethnicity closely resembled the ethnic distribution within Cluj county.

Intent of injury

The majority (77.8%) of the injuries were unintentional (Table 1). Self-harm and suicide accounted for 18% of all injuries, whereas assaults represented only 4.3%. Boys were 1.3 times more likely to sustain an unintentional injury and more than twice as likely to be treated for self-harm than girls (Table 2). Boys, however, were less likely than girls to attempt suicide. Compared with children younger than 5 years, children aged 5–14 and 15–18 years were significantly less likely to experience an unintentional injury. Assaults were 2.6 (95% confidence interval: 1.00–6.99) times more likely for those aged 5–14 years than those younger than 5 years, and 4.6 (95% confidence interval: 1.71–12.47) times more likely for those aged 15–18 years. Over half of the injuries from self-harm and suicide occurred in those older than 14 years. Self-harm was over three times more likely among those aged 15–18 years than those aged 5–14 years, and suicide attempts were six times more likely among those aged 15–18 years than those aged 5–14 years.

Unintentional injuries most commonly occurred at home (51.9%) or on the street (31.7%) (Table 3). Assaults, however, were much more likely to occur in recreational

Table 1 Demographic and injury event characteristics by intent, children age 0–18 years, Children's Clinical Hospital, Cluj, Romania, 1999–2003

	Intent				
	Unintentional	Assault	Self-harm	Suicide attempt	Total
Variables	*n* (%)	*n* (%)	*n* (%)	*n* (%)	*n*
Total	912 (77.8)	51 (4.3)	121 (10.3)	89 (7.6)	1173
Sex ($P<0.0001$)					
Female	351 (38.5)	18 (35.3)	31 (25.6)	72 (80.9)	472
Male	561 (61.5)	33 (64.7)	90 (74.4)	17 (19.1)	701
Age group ($P<0.0001$)					
Younger than 5 years	284 (32.6)	5 (10.0)	1 (0.9)	0	290
5–14 years	465 (53.4)	25 (50.0)	47 (41.2)	24 (28.9)	565
15–18 years	122 (14.0)	20 (40.0)	66 (57.9)	59 (71.1)	268
Ethnicity ($P<0.0001$)					
German	5 (0.6)	0	1 (0.8)	2 (2.3)	8
Hungarian	110 (12.2)	3 (5.9)	18 (15.0)	12 (13.6)	143
Roma	38 (4.2)	3 (5.9)	3 (2.5)	5 (5.7)	49
Romanian	741 (82.1)	45 (88.2)	98 (81.7)	69 (78.4)	953
Other	8 (0.9)	0	0	0	8
Place of injury occurrence ($P<0.0001$)					
Some other's home	5 (0.6)	0	28 (24.6)	2 (2.3)	35
Child's home	448 (51.3)	18 (36.7)	29 (25.4)	66 (77.7)	561
Farm	11 (1.3)	0	0	0	11
Recreational setting	64 (7.3)	7 (14.3)	24 (21.0)	0	95
School	42 (4.8)	11 (22.4)	10 (8.8)	11 (12.9)	74
Street	277 (31.7)	7 (14.3)	9 (7.9)	1 (1.2)	294
Unspecified	27 (3.1)	6 (12.2)	14 (12.3)	5 (5.9)	52
Type of injury ($P<0.0001$)					
Superficial (including contusions)	320 (37.0)	29 (59.2)	0	1 (0.8)	350
Open wound	90 (10.4)	5 (10.2)	0	0	95
Fracture	28 (3.2)	0	0	0	28
Intracranial injury	8 (0.9)	0	0	0	8
Burn	39 (4.5)	2 (4.1)	0	0	41
Poisoning	61 (7.0)	0	5 (4.2)	73 (85.9)	139
Toxic effect	184 (21.3)	0	113 (95.0)	12 (14.1)	309
Other/unspecified injury	135 (15.6)	13 (26.5)	0	0	148
Disposition ($P<0.0001$)					
Hospital	505 (60.3)	25 (52.1)	18 (16.8)	74 (92.5)	622
Home	332 (39.7)	23 (47.9)	89 (83.2)	6 (7.5)	450

Table 2 Childhood injury demographic characteristics by intent, Children's Clinical Hospital, Cluj, Romania, 1999–2003

	Unintentional		Assault		Self-harm		Suicide attempt	
Variables	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Sex								
Male	1.30	1.02–1.77	1.20	0.69–2.23	2.10	1.36–3.19	0.10	0.08–0.24
Female	1.00	–	1.00	–	1.00	–	1.00	–
Age group								
Younger than 5 years	1.00	–	1.00	–	–	–	–	–
5–14 years	0.10	0.05–0.25	2.60	1.00–6.99	1.00	–	1.00	–
15–18 years	0.02	0.09–0.45	4.60	1.71–12.47	3.60	2.40–5.41	6.40	3.86–10.50
Place of injury occurrence								
Home	1.00	–	1.00	–	1.00	–	1.00	–
Recreational setting	0.60	0.40–1.00	2.60	1.05–6.37	3.20	1.89–5.53	–	–
School	0.40	0.25–0.68	5.70	2.60–12.70	1.50	0.74–3.11	1.40	0.70–2.77
Street	5.10	3.04–8.66	0.80	0.33–1.94	0.30	0.15–0.63	0.03	0.004–0.20
Unspecified	0.30	0.19–0.60	4.30	1.62–11.33	3.60	1.83–6.99	0.80	0.33–2.21

CI, confidence interval; OR, odds ratio.

Table 3 Childhood injury intent by age and sex, Children's Clinical Hospital, Cluj, Romania, 1999–2003

	Age					
	Younger than 5 years	5–14 years	15–18 years	Total		
	n (%)	*n* (%)	*n* (%)	*n*	χ^2	*P* value
Females						
Total	123 (27.3)	197 (43.7)	131 (29.0)	451	111.9	<0.0001
Intent						
Unintentional	121 (98.4)	155 (78.7)	58 (44.3)	334	100.5	<0.0001
Assault	1 (0.8)	10 (5.1)	7 (5.3)	18	4.5	0.11
Self-harm	1 (0.8)	14 (7.1)	16 (12.2)	31	12.9	0.002
Suicide attempt	0	18 (9.1)	50 (38.2)	68	81.8	<0.0001
Males						
Total	167 (25.0)	364 (54.6)	136 (20.4)	667	139.4	<0.0001
Intent						
Unintentional	163 (97.6)	310 (85.2)	64 (47.0)	537	133.1	<0.0001
Assault	4 (2.4)	15 (4.1)	13 (9.6)	32	9.2	0.01
Self-harm	0	33 (9.1)	50 (36.8)	83	101.4	<0.0001
Suicide attempt	0	6 (1.6)	9 (6.6)	15	16.2	0.0003

settings, school, or unspecified locations. Self-harm most commonly occurred in recreational settings, whereas suicides were most frequently attempted at home. The most frequent injuries were soft tissue injuries (37.0%), but intoxications (21.3%) and poisoning (7.0%) were also common.

Cause of injury

Falls were a leading cause of injury for both boys and girls in the younger-than-5 and 5–14-year age groups (Table 4). Falls were not a common cause of injury for boys or girls older than 14 years. Intentional injuries and fights were uncommon among girls and boys younger than 15 years, and fights were the cause of injury for only 8% of boys older than 14 years. Dog bites were an unexpectedly large cause of injury and were responsible for 15 (3.3%) of injuries for girls and 26 (3.9%) of injuries for boys. Dog bite injuries were most common among children between 5 and 14 years. Pedestrian and bicycle injuries were the cause of nearly a quarter of all injuries among those aged 5–14 years for both boys and girls. However, other transportation injuries, including motor vehicle occupants, accounted for less than 10% of injuries in all age and sex groups. Transportation injuries excluding pedestrian/bicycle decreased with age for girls.

Poisoning, which was coded to include toxic effects, was one of the leading causes of injury for all age groups and for both boys and girls (Table 4). Poisonings accounted for 68.7% of injuries for girls older than 15 years and 53.3% of injuries for boys in this age group. Over half of the poisonings were unintentional (Tables 5 and 6). Carbon monoxide poisoning was a common cause of unintentional poisoning and was the source of 41.4% of unintentional poisonings among those aged 5–14 years and 37.5% among those aged 15–18 years. Medication was also a common cause of unintentional poisoning for all age groups, and was also a frequently used method of suicide attempt. Medication was used by itself or in combination with other substances in 87.1% of all suicide attempts. More than one-fourth of poisonings were coded as self-harm, and alcohol was the cause of 93% of these for age groups of 5–14 and 15–18 years.

Table 4 Injury mechanism by preschool/school age and sex, Children's Clinical Hospital, Cluj, Romania, 1999–2003

	Age					
	Younger than 5 years	5–14 years	15–18 years	Total		
	n (%)	*n* (%)	*n* (%)	*n*	χ^2	*P* value
Females						
Total	123 (27.2)	198 (43.8)	131 (29.0)	452	88.3	<0.0001
Injury mechanism						
Transportation	9 (7.3)	14 (7.1)	4 (3.0)	27	2.8	0.25
Burn	5 (4.1)	5 (2.5)	1 (0.8)	11	2.9	0.23
Dog bites	2 (1.6)	10 (5.0)	3 (2.3)	15	3.4	0.18
Fall	43 (35.0)	30 (15.1)	9 (6.9)	82	35.8	<0.0001
Machinery	1 (0.8)	3 (1.5)	1 (0.8)	5	0.5	0.76
Pedestrian/Bike	6 (4.9)	46 (23.2)	11 (8.4)	63	26.0	<0.0001
Poisoning	48 (39.0)	66 (33.3)	90 (68.7)	204	42.4	<0.0001
Unarmed brawl/fight	1 (0.8)	6 (3.0)	5 (3.8)	12	2.4	0.30
Other[a]	8 (8.1)	18 (9.1)	7 (5.3)	33	1.8	0.41
Males						
Total	168 (25.0)	367 (54.6)	137 (20.4)	672	113.4	<0.0001
Injury mechanism						
Transportation	7 (4.2)	25 (6.8)	5 (3.7)	37	2.7	0.26
Burn	15 (8.9)	7 (1.9)	2 (1.5)	24	18.7	<0.0001
Dog bites	1 (0.6)	22 (6.0)	3 (2.2)	26	10.3	0.006
Fall	44 (26.2)	81 (22.1)	16 (11.7)	141	10.2	0.006
Machinery	7 (4.2)	16 (4.4)	4 (2.9)	27	0.5	0.76
Pedestrian/Bike	10 (6.0)	91 (24.8)	16 (11.7)	117	32.4	<0.0001
Poisoning	70 (41.7)	80 (21.8)	73 (53.3)	223	51.9	<0.0001
Unarmed brawl/fight	3 (1.8)	10 (2.7)	11 (8.0)	24	10.2	0.006
Other[a]	11 (6.6)	35 (9.5)	7 (5.1)	53	3.2	0.20

[a]Other is comprised of: Cut/Pierce, drowning, firearm, nature/environment (excluding dog bites), overexertion, struck by/against (excluding unarmed brawl/fight), suffocation, NEC, not elsewhere classified.

Table 5 Childhood injury intoxication type by age and intent, Children's Clinical Hospital, Cluj, Romania, 1999–2003

	Unintentional				Suicide attempt				Self-harm			
	Age				Age				Age			
	Younger than 5 years	5–14 years	15–18 years	Total	Younger than 5 years	5–14 years	15–18 years	Total	Younger than 5 years	5–14 years	15–18 years	Total
	n (%)	*n* (%)	*n* (%)	*n*	*n* (%)	*n* (%)	*n* (%)	*n*	*n* (%)	*n* (%)	*n* (%)	*n*
Total	111 (50.2)	70 (31.7)	40 (18.1)	221	0	24 (30.4)	55 (69.6)	79	1 (0.9)	44 (41.1)	62 (57.9)	107
Intoxication type												
Carbon monoxide	8 (7.2)	29 (41.4)	15 (37.5)	52	0	0	1 (1.8)	1	0	0	0	0
Alcohol	1 (0.9)	1 (1.4)	3 (7.5)	5	0	0	2 (3.6)	2	0	41 (93.2)	58 (93.6)	99
Medication	36 (32.4)	16 (22.9)	12 (30.0)	64	0	21 (87.5)	48 (87.3)	69	1 (100.0)	1 (2.3)	3 (4.8)	5
Other	66 (59.5)	24 (34.3)	10 (25.0)	100	0	3 (12.5)	4 (7.3)	7	0	2 (4.6)	1 (1.6)	3

Admissions and discharges from the emergency department

More than half of children were admitted to a hospital, of which 7.7% were transferred to a specialized surgical hospital for severe traumatic brain injuries (Table 6). Slightly more girls than boys were admitted, but admission proportions did not differ by age categories. More than 90% of suicide attempts were admitted, whereas only 16.8% of injuries from self-harm were admitted. Injuries from dog bites led to the highest proportion of admissions, followed by transportation injuries (72.9%) and pedestrian/bicycle injuries (68.2%). Burn injuries were least likely to result in admission.

Discussion

Childhood injuries are an important public health problem in Romania, and this data will help prioritize prevention strategies. Consistent with previous literature, more men than women experienced injuries in all age groups [5,36,37]. Unlike nonfatal injury rates in the United States, which peak among 15–19-year-olds, children younger than 5 years had the highest injury rates in Romania.

Poisoning was the leading cause of injury among children in Romania, and ranks much higher as a cause of injury when compared with the United States where poisoning ranks as the ninth leading cause of injury-related

Table 6 Demographic and injury event characteristics by emergency department disposition, Children's Clinical Hospital, Cluj, Romania, 1999–2003

	Home	Hospital	Total		
	n (%)	*n* (%)	*n*	χ^2	*P* value
Total	462 (42.0)	638 (58.0)	1100	6.0	0.01
Sex					
Female	166 (37.6)	276 (62.4)	442	6.0	0.01
Male	296 (45.0)	362 (55.0)	658	6.0	0.01
Total age	443 (42.4)	602 (57.6)	1045	0.9	0.64
Younger than 5 years	117 (44.8)	144 (55.2)	261	0.8	0.36
5–14 years	224 (41.3)	318 (58.7)	542	0.5	0.47
15–18 years	102 (42.1)	140 (57.9)	242	0.008	0.93
Total intent	450 (42.0)	622 (58.0)	1072	116.1	<0.0001
Assault	23 (47.9)	25 (52.1)	48	0.7	0.39
Self-harm	89 (83.2)	18 (16.8)	107	82.8	<0.0001
Suicide attempt	6 (7.5)	74 (92.5)	80	42.2	<0.0001
Unintentional	332 (39.7)	505 (60.3)	837	8.4	0.004
Total cause	453 (42.0)	625 (58.0)	1078	45.0	<0.0001
Transportation	19 (27.1)	51 (72.9)	70	6.8	0.009
Burn	17 (56.7)	13 (43.3)	30	2.7	0.099
Dog bites	4 (10.0)	36 (90.0)	40	17.5	<0.0001
Fall	96 (43.6)	124 (56.4)	220	0.3	0.59
Machinery	12 (38.7)	19 (61.3)	31	0.1	0.70
Pedestrian/Bike	57 (31.8)	122 (68.2)	179	9.1	0.003
Poisoning	195 (50.1)	194 (49.9)	389	16.4	<0.0001
Unarmed brawl/fight	14 (40.0)	21 (60.0)	35	0.06	0.81
Other[a]	39 (46.4)	45 (53.6)	84	0.7	0.39

[a]Other is comprised of: Cut/Pierce, drowning, firearm, nature/environment (excluding dog bites), overexertion, struck by/against (excluding unarmed brawl/fight), suffocation, NEC, not elsewhere classified.

emergency department visits for children younger than 5 years (*http://www.cdc.gov/ncipc/wisqars/default.htm*) and the European Union where poisoning is the fourth leading cause of child injury death [38]. Romania has not developed pediatric poisoning prevention programs like those that have been effective in other countries, such as child-resistant packaging, labeling, and education [38,39].

Carbon monoxide was a frequent cause of childhood poisoning in Romania. Owing to economic conditions, open gas flames and other unsafe heating methods are commonly used for heating, increasing both fire and carbon monoxide poisoning risk. Educational programs about fire and carbon monoxide safety have not been widely implemented, and carbon monoxide detectors and smoke alarms are rarely found in households. Effective prevention approaches could include local policies that mandate smoke alarms and carbon monoxide detectors or educational programs that teach safety, such as the Teach Injury Prevention Program of the American Academy of Pediatrics (*http://www.aap.org/family/tippmain.htm*) or Riskwatch, an elementary safety education program developed by the National Fire Protection Association (*http://www.nfpa.org/riskwatch/home.html*).

Motor vehicle occupant injuries in children were relatively infrequent when compared with developed countries. Romanian youth do not begin driving until 18 years of age, compared with 16 or younger in the United States [40], and there is less reliance on personal vehicles for transportation. This decreased exposure as a motor vehicle occupant will reduce injury rates and the number of inexperienced drivers on the road. Maintaining the minimum driving age at 18 may be a positive policy strategy. However, pedestrian and bike-related injuries were frequent among Romanian children. Although some of this trend may be because of increased exposure to walking and bicycling for transportation, the conditions for pedestrians and bicyclists are also unfavorable in the Romanian traffic environment, which does not provide separate pathways or lanes for bicycles. In addition, the use of helmets and other protective equipment while biking or playing is limited owing to high costs and lack of education (no data available for country). Availability of bike helmets as well as school-based education regarding traffic rules needs to be promoted. Environmental strategies to increase pedestrian and bicycle safety may decrease injuries while increasing walking and bicycling, which is a positive outcome for physical fitness.

Self-harm and suicide attempts were high among youth, but have not been recognized as a public health problem in Romania. Stressful socio-economic conditions may pose psychological burdens on youth (especially girls) who may not have the skills and resources to deal with high-pressure situations in either family or peer environments [9]. Early detection of psychological issues as well as availability of psychological counseling in schools may be a possible solution.

Dog bites were also a frequent occurrence for which there is no wide public awareness. As information on the

ownership of the dogs was not available for this study, it is suspected that many of the bites were inflicted by feral dogs. Currently, efforts to capture feral dogs are minimal, and the dangers of wild dogs are not routinely taught to children. Efforts to reduce the population of feral dogs are a priority for both public safety and disease prevention.

A small percentage of injuries were intentional assaults. Although this may represent a more peaceful community, it could also be as a result of underreporting or lack of recognition of child maltreatment and abuse. Additional training of health care providers on the identification of child maltreatment and domestic violence may be necessary. Furthermore, there were no reports of weapons involved in injuries, which could also decrease the need for hospital treatment after an altercation. Personal firearms are subject to very strict regulations in Romania and are not widely available, and this is likely to contribute substantially to the low number of teenaged emergency visits for assault.

This study has several important strengths. The review of full medical records is a more reliable and valid data collection method than the use of logs, such as those maintained in the emergency department, because full review allows for better case identification and provides more information [41–43]. As we were able to review all eligible records, we have the complete patient census rather than a patient sample. To further ensure the quality of data, standards for quality assurance were established in different phases of the process to ensure accurate identification of cases and reliable coding and data entry by trained personnel. Finally, this is a low cost surveillance mechanism documented to be feasible in various countries such as Canada [44], Jamaica [45], and Uganda [46]. The integration of computerized surveillance will be increasingly feasible as technology becomes less expensive and software more widely available.

Study limitations

The present study also has several limitations. Study data come from one medical unit that provides regional coverage, and this patient population may not be generalizable to the entire country. However, it will be both beneficial and interesting to compare these data with data at the national and regional levels as such data become available.

Conclusions

Effective interventions need to be based on sound epidemiological data [47]. Surveillance data on childhood injury are necessary to develop appropriate intervention strategies and to guide decisions for effective education, policy, and environmental changes. An active surveillance system based in hospital emergency departments, such as the one presented, would improve the validity and reliability of data collection on childhood injuries [41]. This basic childhood injury surveillance system was the first of its kind in Romania and has important implications for future practice. With relatively limited resources it was possible to establish a functional surveillance system that allowed collection of baseline data to support the development of future injury prevention programs and policies. Examples of interventions may include environmental changes, legislation, and health education (directed to children, families, physicians, and policy makers). Forward thinking, especially in health policy, will have the potential to reduce future risks of childhood injury. Furthermore, this type of surveillance would allow injury prevention interventions to be prioritized and appropriately evaluated [48].

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