

Use of Pre-Hospitalization Services in Two Population Groups of Injured Children and Adolescents in Israel

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Key words: injuries, children, severity, pre-hospital care, access to care

Abstract

Background: Trauma management includes the care provided both in hospital and by emergency medical systems in the community. In many cases it is the parents who decide where to take an injured child for care, depending on the circumstances and severity of the injury, the personal characteristics of the injured or the carer and the availability and accessibility of services.

Objectives: To examine the use of pre-hospitalization services and reasons for their use by children and adolescents according to the injury and personal characteristics.

Methods: The study group comprised 924 Israeli citizens aged 0–17 years hospitalized for injuries in six hospitals across Israel. Carers were interviewed in the hospital regarding the circumstances of the injury event, the use of pre-hospitalization services, and sociodemographic characteristics. Data on the cause and nature of the injury were obtained from the hospital records.

Results: The proportion of severe injuries (Injury Severity Score 16+) was higher in Arab children than Jewish children (15% and 9% respectively). Sixty-three percent of the Arab children and 39% of the Jewish children used community services prior to hospitalization. The odds ratio of proceeding directly to the hospital was 0.44, 95% confidence interval 0.29–0.69, for the Arab compared to the Jewish children, controlling for severity, cause and nature of the injury, sociodemographic characteristics, and the reported availability of ambulance services.

Conclusions: More Arab than Jewish carers tended to seek care in the community for an injured child, but the effect of personal characteristics on seeking care was similar in both population groups. Issues of availability and accessibility of services may explain the differences.

IMAJ 2007;9:724–728

Trauma management includes the care provided both in hospital and by emergency medical systems in the community [1]. In many cases it is the parents who decide where to take an injured child for care. This could depend on the circumstances and severity of the injury and the personal characteristics of the injured or the carer/parent. The availability and accessibility of services, and factors related to costs or to the home and family environment – not always associated with socioeconomic level but with sociocultural characteristics as well – have been shown to play a role in seeking care [2,3].

In Israel, the 0–17 year old population comprises 69% Jews and 31% Arabs [4]. The National Insurance Law, in effect since 1995, covers universal care according to a “basket of services” and hospitalizations for all citizens. While a basic tenet of the law is equity, issues of availability and accessibility – such as

costs, transportation and language – remain a concern affecting minority groups. In addition, and specially for women (the usual carers), physical and social exposure and communication with male doctors may limit their access to health care [5,6]. With regard to childhood injuries, a national study of emergency room admissions and their outcome found inequalities among children in Israel (lower ER attendance rates, similar hospitalization rates and higher mortality rates among Arab than Jewish children) [7]. A possible explanation for these findings was a differential pattern of use of health services by the population groups. The present study investigates the use of pre-hospitalization services by injured children and adolescents who were eventually hospitalized, according to the injury characteristics and personal features of the child and carer.

Subjects and Methods

The study population consisted of 574 Arabs and 350 Jews aged 0–17 years, citizens of Israel, hospitalized for injuries in six hospitals throughout the country. Four of the six hospitals were level I trauma centers (located in major cities and providing the full range of trauma care daily, with 24 hour availability of in-house surgeons, including specialties such as neurosurgery and burn units), and two were level II (which do not include the above mentioned services). The sample size selected allows detection of a difference of 5% in a given characteristic, with a ratio of sample sizes of 1.5, a significance level of 0.05 and a power of 0.80 [8]. This ratio was selected to enable an appropriate representation of the Arab population.

The study was approved by the ethics committees of the hospitals. Data were collected from April to October 2001, every day of the week except Saturday, based on information on hospitalized children from the recorded disposition (admission or discharge) in the ER logs (about 10% are hospitalized). To assess representativeness of the sample, data from this study were compared with data from the trauma registries in four of the hospitals for the study period. This comparison showed, in both population groups, a similar proportion of admissions across days of the week, age and gender distribution, and severity of the injury.

On selected days in each hospital, the children's carers (90% were parents, 3% other family members, and 7% others) – with no difference between Jews and Arabs – were interviewed in the

ER = emergency room

hospital in Arabic or Hebrew, after providing informed consent, on the causes and circumstances of the injury, pre-hospitalization care, and availability and accessibility of the services. Questions were also asked regarding sociodemographics (population group, age and gender of the child, mother's age, education and working status, and number of children in the family). Data were extracted from hospital files on cause, type and severity of the injury. External causes of injury were classified according to the International Classification of Diseases (ICD-9 CM) [9] as: transport-related injuries (E800-E848), falls (E880-E888), burns (E890-E899, E924) and others, excluding misadventures of medical treatment (E870-E879), late effects (E929), adverse effect of treatments (E930-E949), assaults (E961-E969), legal interventions (E970-E978), and operations of war (E990-E999). Injuries were classified according to their anatomic profile [10] in hierarchical order (each profile may include the subsequent one listed but not the preceding one) as: a) definite traumatic brain injury type I (with loss of consciousness); b) other head, face and neck injuries; c) other head, face and neck injuries and extremities; d) extremities; and e) other injuries. The severity of the injury was classified according to the Injury Severity Score [11].

Statistical analysis

Frequency distributions, cross-tabulations and logistic regressions were performed. The outcome variable was whether, after injury, children proceeded directly to the hospital or attended primary care or emergency services in the community. The independent variables introduced into the logistic regression model were those found significantly associated to the outcome in the univariate analysis. Interaction terms between population group and all variables in the model were also introduced in the logistic regression analysis. The analysis was done by the SPSS package, 1999. Alpha ≤ 0.05 was considered statistically significant.

Results

The Arab population was characterized by a higher proportion of young children, younger mothers, mothers having fewer years of education, mothers not working outside their homes, and a larger number of children per family, than in the Jewish population [Table 1]. The proportion of boys and girls was similar in both populations.

Causes, profile and severity of injuries

The proportion of falls was similar among Arab and Jewish children [Table 2]. However, among those who fell there was a higher proportion of Arab than of Jewish children falling down stairs (39.5% and 19.8% respectively). The proportion of children injured by transport-related causes was also similar in both population groups, although Arab children sustained more pedestrian injuries than Jewish children (55.9% and 36.1% of the transport-related injuries respectively).

The profile of the injury was not significantly different between Jewish and Arab children, but the relative frequency with which Arab children presented with severe injuries (16+) was 1.6 times the frequency for Jewish children presenting with such injuries.

Table 1. Selected characteristics of the injured by population group

	Jews (N=350)		Arabs (N=574)	
	n	%	n	%
Age of child (yrs)*				
0-4	119	34.4	274	48.4
5-9	108	31.2	164	28.9
10-14	90	26.0	87	15.3
15-17	29	8.4	42	7.4
Gender				
Boys	245	70.2	392	68.3
Girls	104	29.8	182	31.7
Age of mother (yrs)*				
18-29	64	19.1	185	35.4
30-39	166	49.6	244	46.7
≥ 40	105	31.4	93	17.8
Education of mother (yrs)*				
≤ 11	39	12.4	273	58.4
12	141	44.9	137	29.3
≥ 13	134	42.7		12.2
Working status of mother*				
Yes	203	60.1	66	11.7
No	135	39.9	497	88.3
No. of children*				
1-2	111	32.2	120	21.1
3	94	27.2	99	17.4
4	73	21.2	101	17.8
≥ 5	67	19.4	248	43.7

* $P < 0.001$

Table 2. Injury characteristics by population group

	Jews (N=350)		Arabs (N=574)	
	n	%	n	%
Causes of injury				
Falls	147	46.5	227	45.0
Transport related	78	24.7	115	22.8
Burns	23	7.3	50	9.9
Others	68	21.5	113	22.4
Total	316	100.0	505	100.0
Profile of injury				
Definite TBI type I	42	13.5	63	13.1
Other head injuries (not including extremities)	111	35.7	190	39.5
Head injuries and extremities	32	10.3	34	7.1
Extremities	109	35.0	149	31.0
Other injuries	17	5.5	45	9.3
Total	311	100.0	481	100.0
Injury Severity Score				
1	84	27.4	134	28.2
2-8	130	42.3	187	39.4
9-14	65	21.2	84	17.7
16+	28	9.1	70	14.7
Total	307	100.0	475	100.0

TBI = traumatic brain injury

The odds ratio for an Arab child to have an ISS of 16+ was 1.69, 95% confidence interval 1.05–2.73, relative to a Jewish child, controlling both for the cause of injury and the age of the child.

Pre-hospitalization care

Among the children who were hospitalized, the proportion of those taken directly to the hospital for treatment was lower in Arabs than Jews (37.1% and 61.0% respectively). The rest of the children, in both population groups, were taken to primary care clinics or emergency services in the community prior to their hospitalization. Thirty-five percent of the Arab children were evacuated to the hospital by ambulance as compared to 44% of the Jewish children.

Table 3. Odds ratio of proceeding directly to the hospital by population group, injury characteristics, sociodemographic variables and reported availability of ambulance (logistic regression)

	n	Odds ratio	95% confidence intervals	P
Population group				0.000
Jews	253	1		
Arabs	376	0.44	0.29–0.69	
Cause of injury				0.001
Transport related	157	2.27	1.29–3.97	0.004
Falls	316	0.99	0.59–1.66	0.955
Burns	54	0.70	0.32–1.54	0.377
Other	102	1		
Injury Severity Score				0.002
1	158	1		
2–8	259	1.35	0.84–2.16	0.218
9–14	127	2.67	1.50–4.73	0.001
16+	85	3.27	1.55–6.93	0.002
Injury profile				0.051
Definite TBI type I	87	1		
Other head injuries	249	1.20	0.60–2.41	0.601
Other head injuries and extremities	59	2.91	1.23–6.88	0.015
Extremities	196	1.87	0.89–3.92	0.096
Other	38	1.91	0.74–4.94	0.179
Age of child (yrs)				0.113
0–4	263	1		
5–14	196	0.82	0.52–1.28	0.380
15–17	170	1.36	0.80–2.31	0.256
Education of mother (yrs)				0.174
0–11	247	1		
12	217	1.47	0.93–2.33	0.096
13+	165	1.57	0.92–2.67	0.101
Age of mother (yrs)				0.095
18–29	165	1		
30–39	317	1.50	0.96–2.37	0.077
40+	147	1.88	1.04–3.39	0.037
Working status of mother				0.996
No	420	1.00	0.63–1.58	
Yes	209	1		
Reported availability of ambulance				0.298
No	253	1.21	0.84–1.75	
Yes	376	1		

The odds ratio for an Arab child, relative to a Jewish child, to proceed directly to the hospital was 0.44 (95% CI 0.29–0.69), controlling for the cause, severity, anatomic profile of the injury, and the sociodemographic variables [Table 3]. Cause, mainly transport-related injuries, and severity of the injury were significantly associated with proceeding directly to the hospital. The age of the child, and the mother's education, age and working status were not determinants when controlling for the other variables in the model. The reported availability of ambulance services was also introduced into the model but was not significantly associated with proceeding directly to the hospital. Interactions between population groups with each of the other independent variables were not significant, indicating that the association of the sociodemographic variables, injury-related variables and the reported availability of ambulance in the locality, with proceeding directly to the hospital, was similar between Jews and Arabs.

Availability of services and reasons for their use

Significantly fewer Arab than Jewish carers reported that there was an ambulance service (50.6% and 71.2% respectively, $P < 0.001$), and over 84% of them in both population groups reported that they were available 7 days a week 24 hours a day. Among Arab carers 49.9% reported that there were emergency services available in the locality compared to 58.8% among Jewish carers; among them 79.7% Arab and 67.1% Jewish carers reported that the services were operative 7 days a week, and 73.4% and 59.6% respectively reported that they were operative 24 hours a day.

The existence of primary care clinics in the locality was reported by 92.4% and 93.1% respectively. None of these variables were associated with proceeding directly, or not, to the hospital. More carers of Arab children who were taken to com-

Table 4. Reasons for proceeding directly or not to the hospital among Jews and Arabs (%)

	Proceeding directly to the hospital		Not proceeding directly to the hospital	
	Jews (n=114)	Arabs (n=125)	Jews (n=138)	Arabs (n=321)
Test at location*	87.9	91.9	45.2	62.2
Skilled team*	75.9	82.1	58.7	81.7
Only hospital can treat	74.1	79.3	–	–
Severity of injury**	70.4	81.3	25.4	35.9
Close to home	50.9	44.8	74.6	84.0
Evacuated by ambulance	7.5	8.0	–	–
Does not trust clinic**	8.8	2.4	–	–
Admitted without delay	–	–	71.4	79.0
Personal physician available*	–	–	34.1	68.6
To get referral	–	–	32.8	40.1

Respondents answered more than one question; percentages refer to a positive answer for each question.

* $P < 0.05$ among Jews and Arabs not proceeding directly to the hospital.

** $P < 0.05$ among Jews and Arabs proceeding directly to the hospital.

ISS = Injury Severity Score
CI = confidence interval

munity services prior to the hospital [Table 4] reported that the community services had provision "to conduct tests," to supply "skilled personnel," and that the personal physician of the child was available.

Receiving a referral (to obviate an initial out-of-pocket fee at the ER that could be refunded later) was reported by a higher proportion of Arab (40.1%) than Jewish carers (32.8%), although differences were not statistically significant. Only 5% in both population groups reported language barriers.

Discussion

The findings of this study show that hospitalized Arab children use more community health services prior to the hospitalization than Jewish children. Injury characteristics were independently associated with proceeding directly, or not, to the hospital. The sociodemographic characteristics of carers and children, and the reported availability of emergency services in the community affected both population groups similarly in the use of pre-hospital services.

The hospitalized Arab children had a higher proportion of severe injuries (ISS 16+) than the Jewish children, which can be explained by the higher proportion of pedestrian injuries and children falling from heights, specifically from stairs. This reflects the different environment of the Arab localities, which are smaller and at a lower socioeconomic level than the Jewish ones [12], the former frequently characterized by the absence of sidewalks, scarce play areas and unfinished houses. Studies from Britain demonstrated an association between injury severity and indexes of deprivation [13,14]. The opposite was true among severely injured children in North Carolina [15], and a study in Sacramento County, California, showed no sociodemographic differences in severity among hospitalized patients, although they did find such differences in the incidence of injuries [16]. These inconsistencies may be explained by differences in the settings, age groups and sociodemographic indicators studied, as well as the ascertainment of severity.

It is noteworthy that although the sociodemographic characteristics of the population groups are significantly different, they influence in the same way the care-seeking behavior of the carers. Thus, other factors may dominate the decision-making process of carers facing an emergency. Considering that there may be injuries that are not apparent even to the trained eye [17] and cases that need urgent stabilization and speciality trauma care [18], triage decisions may be difficult even for emergency medical technicians [19], more so for a carer. It appears that the carer's assessment of structural issues, such as a familiar setting and the presence of trained personnel that the carer trusts, may influence his/her decision on the place of treatment for the injured child. It is difficult with the available information to assess whether or not the decision of carers is justified. When the decision may have been taken to go to the hospital, barriers such as family characteristics (e.g., the number of children in the family) and the distance to the hospital and possibly lack of transportation may intervene. In this population, the number of children was not associated with going directly to the hospital. In a study in a

Jerusalem hospital, increased time intervals in seeking care at the primary care level or emergency room for an injured child were found within families with one to three children as compared to families with four children [20]. Although Arab carers reported less availability of emergency services in their localities, these were not significant factors with regard to proceeding directly to the hospital or not. However, distance to the care facility, and possession of a car, which is lower in the Arab population [12], may limit access to hospitals that are located relatively far from the place of residence.

The present study has some potential sources of bias. The study included children with varying degrees of severity. However, it may have overlooked more severe cases that could not be interviewed, or missed those with low severity who were hospitalized for very short periods. Considering that there should not be a difference between interviewing Arab and Jewish carers of children with similar injury severity, or missing low severity cases, the main findings of this study would not be affected. The period of study did not include injuries occurring in winter months due to technical reasons. The use of the hospital service might decrease during those months, especially for the Arab population owing to lack of means of transportation. This could entail an increase in the difference in the care-seeking pattern (i.e., more use of community clinics prior to going to the hospital by Arab children). The fact that interviews were not conducted on Saturday should not affect the findings, since patients are usually not discharged on that day and carers could be interviewed the following day. There might be a differential report regarding the existence and use of medical services, although we cannot ascertain in which direction this would affect the results of the study. Regarding the existence of services in the locality, anecdotal data support the trends in the carers' reports.

In conclusion, hospitalized Arab children have more severe injuries than Jewish children, and more Arab than Jewish carers tended to seek initial care from community services. Although the sociodemographic characteristics of the population groups are quite different, they influence in similar ways the care-seeking behavior of the carers. Sociocultural factors and issues of trust in the service, and accessibility, such as distance to the service, might affect the decision-making process among carers. These are concerns that could be common to populations in different places and contexts. There is a need for carers to receive guidance concerning recognition of the severity of an injury and its care, improvement of accessibility to the services, and guidelines for injury treatment and referral in community clinics. Additional research including emergency room cases will provide further information on the use of pre-hospital services.

Acknowledgments. The study was funded by a grant from the National Institute for Health Service and Health Policy Research, Israel.

We gratefully acknowledge the cooperation of the directors of the hospitals, the pediatrics and records departments, and the data analysis conducted by Ms.Tali Shoshan. Our thanks to Ms. Bella Adler for statistical advice and to Dr. Eitan Gross for his comments on the article.

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Doubt everything at least once, even the proposition that two times two equals four

Georg Christoph Lichtenberg (1742-1799), German scientist and philosopher