The Home Accident Cases Applying to The Pediatric Emergency Department during the Covid-19 Pandemic: What Did the Pandemic Change?

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Abstract

Background: Whether the pandemic caused an increase in the number of home accidents (HA) admitted to the pediatric emergency department (PED) was investigated. Applications in a similar quarter in 2019 and 2020 were compared. Methods: The study was retrospective. Their demographic data, the reason for admission to the hospital, the time of admission, the length of hospital stay, intensive care rate, and interventional procedures were recorded. The two groups were compared to find whether there was any difference. Results: There were 700 and 597 admissions for specified reasons during the specified period in 2019 and 2020, respectively. In 2019, 9.46% of all cases admitted to the PED were HA whereas the rate was 24.43% in 2020. The male/female ratios were similar (p=0.520). The median age in 2020 (36 months) was significantly higher than that in 2019 (33 months) (p=0.010). The main clinical presentations also differed significantly. The incidence of falls, the gastric/intestinal foreign bodies, and the penetrating stab injuries were significantly higher in those in 2020 (p<0.001). Significant differences were also found regarding diagnostic and therapeutic interventions. During the specified period in 2019, 623 patients (89.5%) were discharged from the PED. The rate of discharge in 2020 (84.9%) was significantly lower. Also, there were significantly more hospitalizations in other wards in 2020 than those in 2019 (3.7% vs. 1.0%) (p=0.004). Conclusion: The Covid-19 pandemic caused an increase in the number of HAs cases admitted to the PED relative to all hospital admissions. The most common type of accident was falls, as in the non-pandemic period. The pandemic caused delays in accessing healthcare services, especially for critically ill patients, more frequent hospitalizations, and a decrease in the rate of discharge from the PED.

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Running Title: Home accidents in the Covid-19 pandemic

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Disclosures

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Conclusion: The Covid-19 pandemic caused an increase in the number of HAs cases admitted to the PED relative to all hospital admissions. The most common type of accident was falls, as in the non-pandemic period. The pandemic caused delays in accessing healthcare services, especially for critically ill patients, more frequent hospitalizations, and a decrease in the rate of discharge from the PED.

Keywords: children, Covid-19, home accidents, pediatric emergency department

What is known?

Home accidents are one of the most important causes of mortality and morbidity, especially in preschool children.

Home accidents constitute a significant part of emergency department admissions.

What is new?

- The Covid-19 pandemic has increased the incidence of home accidents.
- One-fourth of cases admitted to the pediatric emergency in the pandemic period in 2020 were home accidents, which was one-tenth in 2019.
- Falls, foreign body ingestions, penetrating stab injuries, and cuts were more common during the pandemic period.

• The pandemic resulted in more cases to be hospitalized for treatment, and the rate of discharge from the emergency department decreased.

The home accident cases applying to the pediatric emergency department during the Covid-19 pandemic: what did the pandemic change?

Introduction:

A new type of coronavirus called pneumonia-associated SARS-CoV-2 (Severe Acute Respiratory Distress Syndrome Coronavirus 2) was reported for the first time in Wuhan in Hubei Province of China in late December 2019. In the following weeks, the virus spread to all parts of China, and to the whole world afterwards. The World Health Organization (WHO) declared the outbreak a Public Health Emergency of International Concern on January 30, 2020, named the disease as coronavirus disease 2019 (Covid-19) on February 12, 2020, and declared a pandemic on March 11, 2020.

The first case in Turkey was reported on March 10, 2020, and since then, measures were introduced to limit the spread of the disease in local communities by preventing people from forming crowded groups. In this context, the first measure was closing educational institutions starting from March 16, 2020, until an unspecified date. Later, the restrictions were further expanded with the "stay at home" orders and by banning children and adolescents under 20 from leaving home after April 4, 2020. As a result of these restrictions, children whose living areas were limited to homes started to come to the emergency departments due to home accidents during their stay at home, mainly due to delayed applications.

The home accidents are among the most common causes of mortality and morbidity in children and constitute a substantial part of admissions to emergency departments. Falls, burns, poisoning, and related complications are common in accidents at or around home. Although the home accidents are seen in all age groups, they are especially a significant problem for children and the elderly, with increased mortality and morbidity.²

This study aimed to determine whether there was an increase in the number of the home accidents admitted to emergency departments because children and adolescents under 18 were subject to stay at home orders during the pandemic.

Materials and Method:

The study was conducted at a university pediatric emergency department (PED) that provides tertiary healthcare services. The home accident cases that presented to our PED within the three-month period from March 11, 2020 to June 10, 2020 were recorded in the data form. The home accident cases in the same period in 2019 were also recorded and investigated retrospectively.

For the cases that presented in these periods, the demographic data, the reason for admission to the hospital, the time of admission, the length of hospital stay, the rate of intensive care, and the interventional procedures (endoscopy, bronchoscopy, surgery, etc.) were recorded. The two groups were compared in order to find any difference between two groups.

Household accidents were classified as falls, poisoning (with drugs and non-drug substances), caustic/corrosive ingestion, foreign body ingestion or aspiration, stab injuries, suffocation, and burns. Considering the age groups where the home accidents were common, the patients were divided into two groups as [?]5 or >5 years old.

Life-saving interventions, including bag-valve-mask (BVM) ventilation, intubation, surgical airway, continuous positive airway pressure (CPAP), bilevel positive airway pressure (BiPAP), defibrillation, cardioversion, external pacing, needle thoracostomy, pericardiocentesis, thoracotomy, intraosseous intervention, marked fluid resuscitation, blood transfusion, major bleeding control, and the use of naloxone, dopamine, atropine, or 50% dextrose, were also determined and recorded in the data form according to the Emergency Severity Index (ESI).³

Ethical approval

The approval was obtained from the local ethics committee before the study (dated 06.06.2020, numbered 6).

Statistical analysis

Descriptive statistics were given as mean \pm standard deviation or median [minimum-maximum] for continuous variables depending on their distribution. Numbers and percentages were used for categorical variables. The normal distribution of the numerical variables was analyzed by the Kolmogorov-Smirnov test and checked by Q-Q plots and histograms.

In comparing two independent groups, the Mann-Whitney U test was applied for variables without normal distribution. Pearson chi-square and Fisher's exact tests were used in 2x2 tables to compare the differences regarding categorical variables. Statistical analyses were performed with Jamovi (version 1.6.3, retrieved from https://www.jamovi.org) and JASP (version 0.13.1, retrieved from https://jasp-stats.org). The significance level (p-value) was set at 0.05 in all statistical analyses.

Results:

There were 700 and 597 pediatric admissions during the specified periods of 2019 and 2020, respectively. The demographic and clinical characteristics of the patients were summarized in Table 1. In 2019, 9.46% of the cases admitted to the emergency department were home accidents; this rate was 24.43% in 2020. The ratio of female and male patients was similar in both periods (p=0.520). The median age of the children admitted in 2020 was significantly higher than that in 2019 (36 months vs. 33 months) (p=0.010). The children aged [?]5 were more commonly admitted in both periods (p=0.463). The rate of the patients referred from an initial receiving hospital significantly increased from 10.5% in 2019 to 18.4% in 2020 (p<0.001). Emergency medical services were used significantly and more frequently for these patients in 2020 (p=0.011). A comparison of monthly admissions between 2019 and 2020 revealed that there was no significant difference between the admissions during 11-31 March in 2019 and 2020, but the percentage of the patients admitted during April 2020 was higher than those in April 2019 (38.5 % vs. 25.3%). The rates in May or 1-10 June in 2020 were significantly lower than those in 2019 (p<0.001). There was no significant difference between the groups in terms of the time of admission and the time to hospital admission (p=0.732 and p=0.147, respectively).

The main clinical presentations showed significant differences between the groups. The proportion of falls, gastric/intestinal foreign bodies, and penetrating stab injuries were significantly higher in 2020 (p<0.001).

Significant differences were found between the groups regarding the diagnostic and therapeutic interventions as well. (Table 2). Although minor surgical procedures were the most common treatment procedures in both groups, they were more frequently performed in 2020 (p<0.001). There were no significant differences between the groups regarding the type of urgency, the ESI triage categories, the Glasgow Coma Scale (GCS) scores at the admission, and the type of poisoning (p>0.05).

ESI resource utilization was homogenous in 2019, and significant differences were found between those admitted in 2019 and 2020 regarding resource utilization. A significantly lower proportion of the patients (16.2%) required no resource utilization in 2020, compared to 30.8% in 2019. Those requiring more than one source were significantly more in 2020.

A total of 623 patients (89.5%) were discharged from the emergency department during the study period in 2019, which was significantly higher than the rate of discharge in 2020 (84.9%). A significantly higher proportion of the patients was hospitalized in other wards in 2020 than in 2019 (3.7% vs. 1.0%) (p=0.004).

A comparison of demographic and clinical characteristics of the cases based on the date of admission was shown in Table 3. The proportion of female patients was significantly higher during the period of May 1 to June 10 (p=0.015). The proportion of female patients increased progressively from 35.0% to 52.65 during the study period. The median age of the patients was significantly lower in this period compared to those in the period of March 11 to April 30 (p=0.023). The majority of the admissions occurred between 4 PM and 0 AM. A significant difference was found in the distribution of admission time in different months (p=0.029)

(Table 3). However, the admission status, the type of admission, the time to hospital admission after the event, and the distribution of the main clinical presentations were similar in the patients admitted in different months (p>0.05).

The distributions of main clinical presentation in two age groups in 2019 and 2020 were shown in Table 4. In both periods, the most common reason for visiting the emergency room was falls in those under five years. Significant differences were found between the age groups regarding the complaints at admission in both years (p<0.001 for both).

Discussions:

The home accidents are the leading preventable accidents in Turkey and in the world. ⁴ They are frequently seen in the preschool period, leading to disabilities or even death. According to the WHO data, burns, falls, and poisoning are the most common accidents in children younger than 15 and this forms one of the most significant health problems. Previous studies have reported that 18-40% of all accidents in Turkey were the home accidents. ^{5,6}

There is a great deal of responsibility for those who care for children in preventing the home accidents. Considering that preschool-age groups spend more time at home, the home environments should be made safer for this age group. The human factor is critical in the emergence of accidents. Lack of knowledge, negligence, or recklessness is the leading cause of such accidents. Environmental factors (such as building, furniture, or toy safety) also contribute to the home accidents. However, the contribution of global pandemics to the emergence of home accidents is not known.

Since respiratory droplets have been reported to be the transmission route for the disease caused by SARS-CoV-2 (Covid-19), which started at the end of 2019 and spread all over the world in a short period, a number of restrictive measures have been taken in order to prevent crowding and the spread of the disease in communities. The first measure in Turkey was closing educational institutions on March 16, 2020, and moving educational activities to online medium until an unspecified date. Subsequently, the restrictions were further expanded after April 4, 2020, with "stay at home" orders and curfews for children and adolescents under 20. These restrictions resulted in children and adolescents spending more time at home.

In this period of uncertainties, changes were introduced in the delivery of emergency healthcare services. The number of the patients admitted to the PEDs has decreased in time considerably. It was also noticed that most of the patients came to the hospital with severe clinical conditions. In this context, we analyzed the impact of the "stay at home" orders with respect to the admissions to PEDs due to the home accidents. Our study indicated that the number of the patients admitted to our PED due to the home accidents during the pandemic period (March – June 2020) was lower than that in the same period of 2019. However, one-fourth of all admissions to the PED were due to the home accidents in this period of 2020 while only one-tenth of all admissions were due to the home accidents in the same period of 2019. In addition, the female/male ratios were similar; the patients in 2020 benefited more from emergency services; falls, foreign bodies in the stomach/intestines, penetrating stab injuries, and cuts were more common in 2020; and there were differences between these periods regarding the diagnostic and the therapeutic procedures. It was also found that the proportion of hospitalized patients was higher in 2020, and these patients were less frequently discharged from the emergency room.

Several studies have demonstrated that the type of the home accidents varied by age. Falls and crashes are the most common types of the home accidents and more frequent in children under the age of five. ^{7,8-12} Falls constitute approximately 30% of trauma admissions and 15% of emergency room admissions ¹³ and are especially common in boys and children under five. ^{14,15-18} Foreign bodies in the esophagus and other parts of the gastrointestinal system are frequent in children between six months and three years. Mortality due to foreign body ingestion is very low. ¹⁹⁻²³ In our study, falls were the most common reason for emergency room admissions in the studied period of 2019 and 2020. In our study, falls were more common in children aged five or younger. Falls, foreign bodies in the stomach/intestines, penetrating stab injuries were more common in 2020 than in 2019. The number of admissions to the emergency room was highest in April. Falls were the

most common reason for visiting the emergency room in all months of the studied period. A previous study has shown that falls were the most common complaint in all months [24].

Studies have shown that boys are more prone to accidents because they are more active and adventurous than girls. ²⁵⁻²⁷ On the contrary, our study indicated that girls and boys involved in the home accidents were comparable. However, more girls were admitted between May 1 and June 10, and the proportion of girls admitted to the emergency room increased almost two-folds during the study.

It was interesting that the number of applications for emergency care was highest between 16:00 and 24:00. With the "stay at home" orders, many institutions implemented flexible or remote working; therefore, a significant portion of the caregivers spent more time at home with their children. It was surprising that the applications to the emergency room were often during these hours.

The rates of recovery or sequelae after home accidents have been reported between 7.8% and 18%. Mortality rates were reported to be between 0% and 2%. ^{12,28,29} In our study, approximately 90% of the cases in 2019 and approximately 85% of the cases in 2020 were discharged from the emergency room without any sequelae. However, it was found that the cases in 2020 required more hospitalization and intensive care compared to the previous year. This was thought to result from the late admission of these cases or more serious type of accidents and injuries. When all cases were considered, most of the cases presented to the emergency department within the first three hours of the accident. Of three patients, who received intensive care, two had ingested button batteries; one of the patients (10 months old) had melena for three days; the other two patients were admitted to the hospital within three hours of ingesting drugs. The length of hospital stay was similar in both years.

Conclusion:

Our study is the first to reveal the impact on emergency services by the home accidents involving children during the "stay at home" period because of the global epidemic. The pandemic resulted in an increase in the proportion of the home accidents in all admissions to the emergency room. The most common type of accident was falls, as in the previous periods. The pandemic caused delays in accessing health services, especially in critical patients, more hospitalizations for treatment, and a decreased discharge rate from the emergency department.

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Tables:

Table 1. Demographic and clinical features of the study groups.

$\overline{ ext{Variable}^+}$	2019 (n=700)	2020 (n=597)	p
Sex			
Female	329 (47.0)	269 (45.1)	0.520
Male	371 (53.0)	328 (54.9)	
Age (month)	$33.0 \; [1.0 - 213.0]$	36.0 [2.0 - 267.0]	0.010
${f Age}^{+}$			
[?]5 years	502 (71.7)	417 (69.8)	0.463
>5 years	198 (28.3)	180 (30.2)	
Date of admission			
March	163 (23.3)	140 (23.5)	< 0.001
April	177 (25.3)*	229 (38.5)*	
May	267 (38.1)*	169 (28.4)*	
June	93 (13.3)*	57 (9.6)*	
Time of admission			
08:00 - 16:00	214 (30.6)	181 (30.8)	0.732
16:00 - 24:00	390 (55.7)	335 (57.0)	
24:00 - 08:00	96 (13.7)	72 (12.2)	
Admission status			
Referred	73 (10.5)	109 (18.4)	< 0.001
Direct admission	620 (89.5)	483 (81.6)	
Type of admission			
Self-presented	680 (97.1)	560 (94.1)	0.011
EMS	20(2.9)	35 (5.9)	
Time to hospital			
admission			
1 hour	306 (51.7)	311 (56.2)	0.147
1-3 hours	155 (26.2)	127(23.0)	
3-6 hours	32 (5.4)	42 (7.6)	
6-12 hours	36 (6.1)	26(4.7)	
>12 hours	63 (10.6)	47 (8.5)	
Main clinical			
presentation			
Falls	422 (60.4)*	406 (68.0)*	< 0.001
Poisoning - drugs	34 (4.9)	17(2.8)	
Poisoning - other	3(0.4)	4 (0.7)	
Ingestion of corrosives	7 (1.0)	8 (1.3)	
Respiratory foreign body	2(0.3)	5 (0.8)	
Esophageal foreign body	2(0.3)	2(0.3)	
Gastrointestinal foreign	$22 (3.1)^*$	8 (1.3)*	
body			
Penetrating stab injury	35 (5.0)*	55 (9.2)*	
Others	172 (24.6)*	92 (15.4)*	

 $^{^+}$ Data shown as n (%) or median [min-max].

EMS: emergency medical services

Table 2. Comparison of diagnostic and therapeutic features concerning emergency service admissions,

 $^{\ ^*}$ Significant difference between the subgroups.

interventions and outcomes.

$\overline{ ext{Variable}^+}$	2019 (n=700)	2020 (n=597)	p
Type of urgency			
Minor urgency (green)	$0 (0.0)^*$	8 (1.3)*	< 0.001
Urgency (yellow)	700 (100.0)*	579 (97.6)*	
Urgency (red)	0 (0.0)*	6 (1.0)*	
GCS	15.0 [13.0 - 15.0]	15.0 [14.0 - 15.0]	0.913
ESI			
ESI 1-2	0 (0)	2(0.3)	NA
(resuscitation-emergent)			
ESI 3 (urgent)	0 (0)	264 (44.2)	
ESI 4 (less urgent)	0 (0)	235 (39.4)	
ESI 5 (non-urgent)	0 (0)	96 (16.1)	
Type of poisoning			
Suicidal	12(27.9)	11 (40.7)	0.395
Accidental	31 (72.1)	16 (59.3)	
Diagnostic			
interventions			
X-ray radiography	271 (38.7)	148 (24.8)	< 0.001
Ultrasonography	3 (0.4)	0 (0.0)	0.254
Computed tomography	29 (4.1)	23 (3.9)	0.902
Biochemical analysis	87 (12.4)	27 (4.5)	< 0.001
Electrocardiogram (%)	27 (3.9)	0(0.0)	< 0.001
Therapeutic	,	, ,	
interventions			
Observation only	338 (48.3)	241 (40.4)	0.005
Intravenous hydration	44 (6.3)	18 (3.0)	0.009
Gastric lavage	9 (1.3)	$0 \ (0.0)^{'}$	0.005
Charcoal	16(2.3)	0 (0.0)	0.001
Antidote	1 (0.1)	0(0.0)	0.999
Endoscopy	2 (0.3)	0(0.0)	0.503
Minor surgical procedures	$17\hat{6} \ (25.1)$	253 (42.4)	< 0.001
Major surgical	1 (0.1)	5 (0.8)	0.100
procedures	,		
Others	0 (0.0)	6 (1.0)	0.009
ESI resource	,		
utilization			
0	215 (30.8)*	97 (16.2)*	< 0.001
1	238 (34.1)	234 (39.2)	
>1	245 (35.1)*	266 (44.6)*	
Outcome	,	,	
Short-term observation in	64 (9.2)	65 (10.9)	0.004
ED	- (-)	()	
Hospitalization in	1 (0.1)	0 (0.0)	
pediatric wards	(- /	()	
Hospitalization in ICU	1 (0.1)	3(0.5)	
Hospitalization in other	7 (1.0)*	22 (3.7)*	
wards	()	(5)	
Discharge	623 (89.5)*	505 (84.9)*	
	()	(02.0)	

$\overline{ ext{Variable}^+}$	2019 (n=700)	2020 (n=597)	p	
Length of hospital stay (day)	$1.0 \ [1.0 - 6.0]$	$1.0 \; [1.0 - 6.0]$	0.799	

 $^{^+}$ Data shown as n (%) or median [min-max].

 ESI : Emergency Severity Index, GCS: Glasgow Coma Scale, ED: emergency department, ICU: intensive care unit

 ${\bf Table~3}~.~{\bf Comparison~of~demographic~and~clinical~characteristics~of~the~admissions~based~on~the~admission~month.$

	D + C	D + C	D + C	D + C	
	Date of admission	Date of admission	Date of admission	Date of admission	
$\overline{ ext{Variable}^+}$	11-31 March (n=140)	April (n=229)	May (n=169)	1-10 June (n=57)	р
Sex	,			,	
Female	49 (35.0)	102 (44.5)	88 (52.1)	30 (52.6)	0.015
Male	91 (65.0)	$127\ (55.5)$	81 (47.9)	27(47.4)	
Age (month)	42.0 [25.0 - 74.5]	36.0 [21.0 – 69.0]	33.0 [18.0 – 66.0]	33.0 [17.0 – 72.0]	0.023
\mathbf{Age}	,	,	,	,	
[?]5 years	90 (64.3)	161 (70.3)	124 (73.4)	41 (71.9)	0.362
>5 years	50 (35.7)	68 (29.7)	45 (26.6)	16 (28.1)	
Time of	,	,	,	,	
admission					
08:00 - 16:00	43 (31.4)	57 (25.3)	63 (37.5)	18 (31.6)	0.029
16:00 - 24:00	81 (59.1)	143 (63.6)	77 (45.8)	33 (57.9)	
24:00 - 08:00	13 (9.5)	25 (11.1)	28 (16.7)	6 (10.5)	
Admission	, ,	,	, ,	, ,	
status					
Referred	22(16.1)	37(16.3)	34(20.1)	16(28.1)	0.169
Direct admission	115 (83.9)	190 (83.7)	135 (79.9)	41 (71.9)	
Type of					
admission					
Self-presented	133 (95.0)	214 (93.9)	154 (91.7)	57 (100.0)	0.100
EMS	7(5.0)	14 (6.1)	14 (8.3)	0 (0.0)	
Time to					
$\mathbf{hospital}$					
admission					
1 hour	73 (57.9)	120 (58.5)	80 (49.1)	37 (64.9)	0.094
1-3 hours	26 (20.6)	44 (21.5)	49(30.1)	7(12.3)	
3-6 hours	8(6.3)	16 (7.8)	15 (9.2)	3 (5.3)	
6-12 hours	8 (6.3)	9(4.4)	3 (1.8)	6 (10.5)	
>12 hours	11 (8.7)	16 (7.8)	16 (9.8)	4(7.0)	
Main clinical					
presentation					
Falls	91 (65.0)	154 (67.2)	118 (69.8)	42 (73.7)	0.414
Poisoning -	7(5.0)	3(1.3)	6 (3.6)	1 (1.8)	
drugs					

 $^{\ ^*}$ Significant difference between the subgroups.

	Date of admission	Date of admission	Date of admission	Date of admission
Poisoning - other	2 (1.4)	0 (0.0)	2 (1.2)	0 (0.0)
Ingestion of corrosives	2 (1.4)	2 (0.9)	4 (2.4)	0 (0.0)
Respiratory foreign body	1 (0.7)	1 (0.4)	3 (1.8)	0 (0.0)
Esophageal foreign body	0 (0.0)	2(0.9)	0 (0.0)	0 (0.0)
Gastrointestinal foreign body	2 (1.4)	5(2.2)	0 (0.0)	1 (1.8)
Penetrating stab injury	11 (7.9)	27 (11.8)	14 (8.3)	3 (5.3)
Others	24 (17.1)	$35\ (15.3)$	$22\ (13.0)$	10 (17.5)

 $^{^+}$ Data shown as n (%) or median [min-max].

EMS: emergency medical services

Table 4. Distribution of application complaints in both years by age groups.

Main clinical	[0] ~			
presentation ⁺	[?] 5 years	> 5 years	p	
2019 (n=700)	$(n{=}502)$	$(n{=}198)$		
Falls	335 (66.9)*	87 (43.9)*	< 0.001	
Poisoning - drugs	19 (3.8)*	15 (7.6)*		
Poisoning - other	2(0.4)	1 (0.5)		
Ingestion of corrosives	7 (1.4)	0 (0)		
Respiratory foreign body	2(0.4)	0 (0)		
Esophageal foreign body	0 (0)*	2 (1)*		
Gastrointestinal foreign	13(2.6)	9 (4.5)		
body				
Penetrating stab injury	14 (2.8)*	21 (10.6)*		
Others	109 (21.8)*	63 (31.8)*		
2020 $(n=597)$	(n=417)	$(n{=}180)$		
Falls	310 (74.3)*	96 (53.3)*	< 0.001	
Poisoning - drugs	8 (1.9)*	9 (5)*		
Poisoning - other	2(0.5)	2(1.1)		
Ingestion of corrosives	6(1.4)	2(1.1)		
Respiratory foreign body	5(1.2)	0 (0)		
Esophageal foreign body	2(0.5)	0 (0)		
Gastrointestinal foreign	6(1.4)	2 (1.1)		
body				
Penetrating stab injury	16 (3.8)*	39 (21.7)*		
Others	62 (14.9)	30 (16.7)		

 $^{^+}$ Data shown as n (%).

 $^{\ ^*}$ Significant difference between the subgroups.