Effects of regional differences on the outcome of cardiopulmonary resuscitation in children: How much different is Gaziantep from Izmir?

Özlem Tolu Kendir1*, Murat Anıl2, Sultan Bent3, Şule Demir2, Emel Berksoy2, Gamze Gökalp2, Gülşah Demir2, Şefika Bardak2

1Akdeniz University, Pediatrics, Emergency Care Unit, Antalya, 2Izmir Tepecik Hospital of Health Sciences University, Pediatrics, Emergency Care Unit, İzmir, 3Gaziantep Cengiz Gökçek Maternity and Pediatrics Hospital of Health Ministry, Pediatrics, Gaziantep, Turkey

*Corresponding author

Abstract:

OBJECTIVES: We aimed to compare the demographic and clinical characteristics between pediatric cardiac arrest patients treated in Gaziantep at South‑eastern Anatolian region and Izmir at Aegean Shore.

MATERIALS And METHODS: We retrospectively reviewed sociodemographic characteristics, laboratory parameters, and clinical outcomes of pediatric patients that underwent cardiopulmonary resuscitation due to prehospital cardiac arrest at two pediatric emergency departments in Izmir Hospital of Health Sciences University and Gaziantep Cengiz Gökçek Kadın Doğum ve Çocuk Hospital of Health Ministry between August 2017 and August 2018.

RESULTS: The present study included 188 patients (112 patients from Gaziantep and 76 patients from Izmir). All patients arrived at the hospital through emergency medical services. The median age was lower (14 days vs. 15 months; \(P < 0.001\)), and the proportion of Syrian refugees was higher in patients from Gaziantep (78.6% vs. 7.9%; \(P < 0.001\)). In both centers, respiratory failure was the most common etiology. In patients from Gaziantep, pH levels were lower (median: 7.10 vs. 7.24), and lactate levels were higher (median: 6 mmol/L vs. 3.6 mmol/L; \(P < 0.001\)). The mortality rate was higher among patients from Gaziantep (27.7% vs. 7.9%; \(P = 0.001\)).

CONCLUSIONS: The rate of Syrian refugees among children who were brought to emergency department due to pre‑hospital cardiac arrest was much higher in Gaziantep compared to Izmir. Syrian children were significantly younger and had more severe tissue hypoxia, resulting in a higher mortality rate.

Keywords: Cardiac arrest, cardiopulmonary resuscitation, children, lactate, prehospital, refugee

Introduction

The cardiopulmonary resuscitation (CPR) is a cascade of life‑saving actions to achieve the survival following cardiac arrest.[1‑3] The incidence of out‑of‑hospital cardiac arrest in children is 2.28–20:100,000 per year, and the discharge rate is 2%–6%.[4‑11] The discharge rate of in‑hospital cardiac arrests was reported as 27%–40%.[10‑12] Post‑CPR survival and neurological outcomes are affected by etiology, setting and time of arrest.[13] How to cite this article: Kendir ÖT, Anıl M, Bent S, Demir Ş, Berksoy E, Gökalp G, et al. Effects of regional differences on the outcome of cardiopulmonary resuscitation in children: How much different is Gaziantep from Izmir? Turk J Emerg Med 2021;21:104‑10.

How to cite this article: Kendir ÖT, Anıl M, Bent S, Demir Ş, Berksoy E, Gökalp G, et al. Effects of regional differences on the outcome of cardiopulmonary resuscitation in children: How much different is Gaziantep from Izmir? Turk J Emerg Med 2021;21:104‑10.
arrest, presence of a witness, time to arrival at the hospital, available medical equipment, high-quality CPR, and postresuscitative care. 

Although there is regional variation in childhood, sudden infant death syndrome, trauma, respiratory failure, and shock are the leading causes of cardiac arrest at the infantile period. 

It is reported that trauma and respiratory failure are the leading causes in Turkey. 

Identification of medical and social reasons related to cardiac arrest will contribute to take the measures and perform appropriate interventions in children. However, comparative pediatric studies, in which different centers shared pediatric CPR experiences, are limited in Turkey. 

The civil war started in March in Syria, 2011, led to the migration of a significant number of refugees to Turkey, and these refugees settled across Turkey, particularly in Istanbul, Gaziantep, Kilis, Hatay, Şanlıurfa, Adana, and Mersin. This population movement affected health parameters in Turkey. We think that the assessment of Syrian children regarding pediatric CPR, and outcomes are essential to develop future health policies.

Our study emphasizes the differences between a Southeastern province, Gaziantep, which harbors a substantial number of Syrian refugees, and Izmir province at the Aegean shore, which holds far fewer Syrian refugees. In this study, we aimed to compare pediatric CPR patients and evaluate the regional differences in the two provinces, which have marked geographic differences.

Materials and Methods

Study locations, duration, and time
This study was conducted at the pediatric emergency departments (EDs) of Izmir Tepecik SUAM (ITSUAM) Hospital of Health Sciences University and Gaziantep Cengiz Gökçek Kadın Doğum Çocuk Hospital of Health Ministry between August 2017 and August 2018. We retrospectively reviewed pediatric patients who underwent CPR due to prehospital cardiac arrest. All patients arrived at the hospital through Emergency Medical Services (EMS). The pediatric ED of the ITSUAM Hospital of Health Sciences University is a subspecialty training clinic where seven clinicians and eight nurses work during each turn of work. The pediatric ED of the ITSUAM provides emergency medical care, including trauma, to all pediatric patients aged below 18 years. During the study period, 168,123 patients presented to ITSUAM ED. In the Pediatric ED of Gaziantep Cengiz Gökçek Kadın Doğum Çocuk (GCGH) Hospital of Health Ministry, three clinicians and eight nurses work during each turn of work. ED of GCGH provides emergency medical care, except trauma, to all pediatric patients aged below 18 years. During the study period, 254,784 patients presented to the ED of GCGH. This retrospective study was approved by the Ethics Committee of Gaziantep University (approval#2018/191, August 01, 2018) and Local Health Authority (approval#65587614-774.99, May 23, 2019).

Management
In both EDs, health-care providers follow basic and advanced life support guidelines published by the American Heart Association (AHA) in 2015. According to Advanced Life Support Guidelines, synchronized ventilation and compression support are provided to nonbreathing pediatric patients with no response to environmental stimuli or gasping with no central pulse or central pulse ≤60 bpm. In both EDs, the support is provided with 15 chest compression and two ventilations through balloon mask by at least two clinicians and three nurses in 2-min-long cycles, and the patient was re-assessed for a maximum of 10 s between the cycles. Automated chest compression device was not used in any patient. Both clinics have an in-service training program. All clinicians and nurses working in EDs had CPR training per AHA guidelines, and training is updated semi-annually. Ambulance crews routinely receive Pediatric Advanced Life Support Training. However, due to the retrospective character of our study, it was not determined how often the ambulance teams who brought patients to both centers received in-service training.

Definitions
Patients who died within 24 h after CPR were accepted
as exitus and those who survived >24 h were considered alive patients.

Study population and inclusion and exclusion criteria
We retrospectively reviewed the electronic charts of all children (age below 18 years) who arrived at the hospital through EMS and underwent synchronized ventilation and chest compression. We included patients who received chest compressions for at least 2 min and had a return of spontaneous circulation (ROSC) for at least 30 min after CPR. Patients with death bruises at arrival, those not meeting the inclusion criteria, with fatal outcomes, and with incomplete diagnostic or laboratory data were excluded.

Data collection
In all patients, electronic medical records were reviewed retrospectively. In patients transferred to another facility, medical records regarding clinical outcomes were obtained from the relevant center. In all patients, age, gender, refugee status (Syrian refugee or not), etiology, venous pH, pCO₂, HCO₃, and lactate levels, and the outcome status (survivor or nonsurvivor) were recorded. Venous blood gas was examined within the first 5 min after spontaneous circulation was achieved. The blood gas analyses were performed by the ABL800 Flex blood gas analyzer (Radiometer®, Denmark) in both centers. The etiology was classified according to potential underlying pathophysiological mechanisms: respiratory failure (not related to trauma, drowning, or foreign-body aspiration), septic shock, cardiogenic shock, trauma, drowning, and foreign-body aspiration. The data were collected under the Helsinki Declaration.

Statistical analysis
We assessed the normality of numerical variables by the Kolmogorov–Smirnov test. The numerical variables are presented with medians and interquartile ranges (IQRs) since their distributions were skewed. Categorical variables are presented with their counts (n) and percentages (%). We used the Mann–Whitney U-test and Chi-squared test to compare the variables between two independent groups. The accepted Type II error in this study was 5%. All statistical analyses were performed using the SPSS for Mac version 20.0 (Statistical Package for Social Sciences, IBM, IL, USA).

Results
Overall, CPR was provided to 211 patients during the study period. However, thirteen patients without ROSC and ten patients already dead at arrival were excluded; thus, the final analysis included 188 patients (GCGH: 112 patients; ITSUAM: 76 patients; median age: 4 months [IQR: 15 days–15 months; minimum–maximum: 1 day–17 years], 102 boys and 86 girls). Ninety-four (50%) patients were Syrian refugees. The most common etiology was respiratory failure (61.2%). Asystole or pulseless electrical activity was detected in all patients. During the first 24 h, 37 cases (19.7%) died, 31 of whom were in Gaziantep.

The patients were younger (median age: 14 days vs. 15 months; P < 0.001), and the proportion of Syrian refugees was higher (78.6% vs. 7.9%; P < 0.001) at GCGH. Venous pH values were lower (median: 7.10 vs. 7.24), whereas the lactate levels were higher (median: 6 mmol/L vs. 3.6 mmol/L) at GCGH (P < 0.001). The mortality rate was also higher at GCGH [27.7% vs. 7.9%; P < 0.001; Table 1].

The median age of the survivors was higher than the nonsurvivors (3 months vs. 15 days; P = 0.028). There were significant differences in venous pH, pCO₂, HCO₃, and lactate levels between survivors and nonsurvivors [P < 0.05, Table 2].

Male gender was more common among Syrian refugees (61.7% vs. 46.8%; P = 0.040), and they were younger (median age: 10 days vs. 4 months (P = 0.004). Septic shock incidence was higher in Turkish citizens (24.5% vs. 8.5%; P = 0.003). Venous pH and HCO₃ levels were lower, and pCO₂ and lactate levels were higher among Syrian refugees (P < 0.05) [Table 3].

Discussion
This is the first study comparing children who underwent CPR in a South-eastern province, GCGH, which harbors a substantial amount of Syrian refugees, and ITSUAM province at the Aegean shore, which holds far less Syrian refugees together, emphasizing regional differences. Our study showed that the children were younger, more severely impaired in metabolic balance, and mortality rates were higher in the province of GCGH, where the Syrian refugee population was significantly higher.

Immigration is an expected consequence of war, leading significant health-care issues for both refugees and the local community dealing with migration.[23] According to the March 2020, data from the Directorate General of Migration Management, 3,647,750 registered refugees are living in Turkey. Of these, 1,657,936 are younger than 18 years of age. There are 146,352 registered refugees in ITSUAM (3.3% of the city population) and 450,031 registered refugees in GCGH (22.1%). GCGH harbors the highest number of refugees following Istanbul.[24] In studies from Turkey, the most common cause for ED presentation was trauma among Syrian children in Hatay, the city on the border of Syria.[25] A study conducted in a PED in Ankara showed that the most common cause was

Immigration is an expected consequence of war, leading significant health-care issues for both refugees and the local community dealing with migration.[23] According to the March 2020, data from the Directorate General of Migration Management, 3,647,750 registered refugees are living in Turkey. Of these, 1,657,936 are younger than 18 years of age. There are 146,352 registered refugees in ITSUAM (3.3% of the city population) and 450,031 registered refugees in GCGH (22.1%). GCGH harbors the highest number of refugees following Istanbul.[24] In studies from Turkey, the most common cause for ED presentation was trauma among Syrian children in Hatay, the city on the border of Syria.[25] A study conducted in a PED in Ankara showed that the most common cause was
In a study from academic PED in Izmir, it was reported that more consultations were ordered for Syrian children, and admission rates to ward or intensive care unit were higher among Syrian refugees.

Table 1: Comparison of patients underwent cardiopulmonary resuscitation in pediatric emergency departments of İzmir Tepecik SUAM Hospital of Health Sciences University and Gökçek Kadın Doğum Çocuk Hospital of Turkish Health Ministry

|                        | GCGH (n=112) | ITSUAM (n=76) | P       |
|------------------------|--------------|---------------|---------|
| Age, median (IQR)      |              |               | <0.001* |
| Age groups             |              |               |         |
| <12 months             | 89 (79.5)    | 30 (39.5)     | <0.001b,c|
| 1-4 years              | 21 (18.8)    | 28 (36.8)     |         |
| 5-12 years             | 2 (1.8)      | 12 (15.8)     |         |
| ≥13 years              | 0            | 6 (7.9)       |         |
| Male gender            | 66 (58.8)    | 36 (47.4)     | 0.118c  |
| Syrian refugee        | 88 (78.6)    | 6 (7.9)       | <0.001c |
| Nonsurvivor            | 31 (27.7)    | 6 (7.9)       | 0.001c  |
| Etiology               |              |               |         |
| Respiratory failure    | 80 (71.4)    | 35 (46.1)     | <0.001c,d|
| Septic shock           | 8 (7.1)      | 23 (30.3)     |         |
| Cardiogenic shock      | 20 (17.9)    | 5 (6.6)       |         |
| Trauma                 | 0            | 11 (14.5)     |         |
| Drowning               | 2 (1.8)      | 2 (2.6)       |         |
| Foreign body           | 2 (1.8)      | 0             |         |
| pH, median (IQR)       | 7.10 (6.90-7.20) | 7.24 (7.07-7.36) | <0.001* |
| Acidosis, pH <7.30     | 92 (82.1)    | 46 (60.5)     | 0.001e  |
| HCO₃⁻, median (mEq/L)  | 15 (5-18)    | 18 (11-22)    | <0.001* |
| pCO₂ (mmHg), median     | 59 (45-69)   | 40 (32-47)    | <0.001* |
| pCO₂ >50               | 73 (65.2)    | 14 (18.4)     | <0.001c |
| Lactate (mEq/L)        | 6 (9-15)     | 3.6 (2-7)     | <0.001* |

Table 2: Comparison of survivors and nonsurvivors among patients underwent cardiopulmonary resuscitation

|                        | Survivor (n=151), n (%) | Nonsurvivor (n=37), n (%) | P       |
|------------------------|-------------------------|--------------------------|---------|
| Age, median (IQR)      | 3 month (15 days-5 months) | 15 days (7 days-6 months) | 0.276*  |
| Age groups             |                         |                          |         |
| <12 months             | 90 (59.6)               | 29 (78.4)                | 0.165b  |
| 1-4 years              | 43 (28.5)               | 6 (16.2)                 |         |
| 5-12 years             | 12 (7.9)                | 2 (5.4)                  |         |
| ≥13 years              | 6 (4)                   | 0                        |         |
| Male gender            | 49 (60.5)               | 17 (54.8)                | 0.586b  |
| Syrian refugee        | 62 (76.5)               | 26 (83.9)                | 0.398b  |
| Etiology               |                         |                          |         |
| Respiratory failure    | 65 (80.2)               | 15 (48.4)                | 0.016b,c|
| Septic shock           | 1 (1.2)                 | 8 (21.6)                 |         |
| Cardiogenic shock      | 14 (9.3)                | 11 (29.7)                |         |
| Trauma                 | 9 (6)                   | 2 (5.4)                  |         |
| Drowning               | 4 (2.6)                 | 0                        |         |
| Foreign body           | 2 (1.3)                 | 0                        |         |
| pH, median (IQR)       | 7.20 (7.10-7.30)        | 6.80 (6.80-6.96)         | <0.001* |
| Acidosis, pH <7.30     | 101 (66.9)              | 37 (100)                 | <0.001b |
| HCO₃⁻, median (mEq/L)  | 16.5 (11.21)            | 5 (3-10.5)               | <0.001* |
| HCO₃⁻ <20              | 106 (70.2)              | 35 (94.6)                | 0.001b  |
| pCO₂, median (mmHg)    | 45 (35-61)              | 78 (52-94)               | <0.001* |
| pCO₂ >50               | 59 (39.1)               | 28 (75.7)                | <0.001b |
| Lactate (mEq/L)        | 4 (2-7)                 | 16 (11-20)               | <0.001* |

*Mann-Whitney U-test, bChi-square test, cOrigin of difference: septic shock and trauma. Bold P values denote statistical significance. ITSUAM: İzmir Tepecik SUAM, GCGH: Gökçek Kadın Doğum Çocuk, IQR: interquartile range
higher.\cite{28} However, none of the studies mentioned above
investigated CPR in the ED. In a study on refugees living
in the USA, it was reported that being a refugee did not
increase the mortality rate.\cite{28} In an Indian study, it was
found that the negative outcome of CPR in children was
associated with the low sociocultural level of the family,
and respiratory problems were more common in those
with low socioeconomic status.\cite{30} In a study conducted
in Canada and the USA on children who received CPR,
it was reported that racial and ethnic differences did not
correlate with the prognosis.\cite{30} In our study, we found
that the mortality rate was significantly higher among
pediatric patients who underwent CPR due to prehospital
cardiac arrest in GCGH than those in ITSUAM. The most
crucial difference between the two centers was that the
majority of patients who underwent CPR in GCGH were
Syrian refugees; however, this rate was markedly lower
in ITSUAM. The patients in ITSUAM were younger, and
their venous blood gas parameters and lactate values
were dramatically lower compared to those in ITSUAM.
Since cardiac arrest due to respiratory failure takes time,
the presence of impaired blood gas parameters and
raised lactate levels suggest delayed presentation to a
health-care facility. These findings indicate that patients
underwent CPR in GCGH had more severe tissue hypoxia
at baseline when compared to those in ITSUAM, which
helps to explain the higher mortality rate among Syrian
refugees and patients underwent CPR in GCGH.

In the literature, it was reported that pediatric cardiac
arrest is more common at infancy and in boys.\cite{32,33} In
agreement with the literature, it was found that the
mortality rate was higher in children younger than 12
months of age. The mean age was markedly lower in
Syrian refugees when compared to Turkish citizens.
The median age corresponding to the neonatal period in
nonsurvivors seems to be one of the causes of a higher
mortality rate in GCGH, where a substantial number of

refugees reside. The high mortality rate in the neonatal
period suggests the insufficiency of antenatal follow-up
and postnatal care. These patients have worse metabolic
balance, which indicates that they were brought to the
hospital late or were not noticed. The unfavorable living
conditions of the refugees may be associated with their
difficult adaptation to another country.

**Limitations**

This study has some limitations. First, it was failed
to accurate records of drugs (mainly adrenalin) used
during CPR in medical records. Second, medical records
regarding chronic diseases were also lacking. Third,
the duration of CPR could not beascertained in both
prehospital and in-hospital settings. Fourth, we could
do not obtain any information about the CPR quality of
ambulance crews transporting the patients to the EDs.
However, we know that the 112 ambulance teams receive
pediatric advanced life support in-service training at
various intervals. Finally, neurological outcomes at
discharge and during follow-up could not be identified.
Besides, long-term neurological assessments were also
lacking in survivors.

**Conclusions**

Our study emphasizes that demographic characteristics
of a geographical region served when assessing CPR
data in a specific localization. As of 2011, the presence
of Syrian refugees in Turkey has an important impact
on medical practice and outcomes. The Syrian children
requiring CPR were significantly younger and had more
severe tissue hypoxia, resulting in a higher mortality rate.

**Prior presentation**

This article was presented in the 15th National Pediatric Emergency
Medicine and Intensive Care Congress (Ulusal XV. Ulusal Çocuk Acil
Tip ve Yoğun Bakım Kongresi) as an oral presentation.

### Table 3: Comparison of Turkish citizens and syrian refugees among children underwent cardiopulmonary resuscitation

|                      | Syrian refugees (n=94), n (%) | Turkish citizen (n=94), n (%) | P         |
|----------------------|-----------------------------|-------------------------------|-----------|
| Age, median (IQR)    | 10 days (5 days- 4 month)    | 4 months (15 days- 12 months) | <0.001*   |
| Male gender          | 28 (29.8)                   | 9 (9.6)                       | <0.001*   |
| Nonsurvivor          | 28 (29.8)                   | 9 (9.6)                       | <0.001*   |
| Etiology             |                             |                               |           |
| Respiratory failure  | 63 (67)                     | 52 (55.3)                     | 0.003bc   |
| Septic shock         | 8 (8.5)                      | 23 (24.5)                     |           |
| Cardiogenic shock    | 18 (19.1)                    | 7 (7.4)                       |           |
| Trauma               | 2 (2.1)                      | 9 (9.6)                       |           |
| Drowning             | 2 (2.1)                      | 2 (2.1)                       |           |
| Foreign body         | 1 (1.1)                      | 1 (1.1)                       |           |
| pH, median (IQR)     | 7.10 (6.80- 7.20)            | 7.15 (7.0-7.20)               | 0.002*    |
| HCO₃⁻ (mEq/L), median (IQR) | 10 (5-18)            | 16 (8-20)                     | <0.001*   |
| pCO₂ (mmHg), median (IQR) | 62 (45-69)              | 56 (38-73)                    | <0.001*   |
| Lactate (mEq/L), IQR | 7 (4-15)                     | 5 (3-14)                      | <0.001*   |

*Mann-Whitney U-test, *Chi-square test, *Origin of difference: Septic shock. Bold P values denote statistical significance. IQR: Interquartile range.
Consent to participate
Taken according to ethical rules.

Authors’ contributions statement
Conceptualization: OTK, MA. Design: OTK, MA. Data Collection or Processing: OTK, MA, SB, ŞD, EB, GG, GD. SB Analysis or Interpretation: OTK, MA. Literature Search: OTK, MA. Writing: OTK, MA. Each author has participated sufficiently in the work to take public responsibility for appropriate portions of the content.

Conflicts of interest
None Declared.

Ethical approval
The study has ethical approval from Ethics Committees of Gaziantep University (approval#2018/191, 01.08.2018) and Gaziantep Local Health Authority (approval#65587614-774.99, 23.05.2019). This article does not contain any studies with human or animal subjects performed by any of the authors. The article contains no libelous or unlawful statements and does not contain any materials that violate any personal or proprietary rights of any other person or entity.

Funding
None declared.

References
1. Yılmaz HL, Karaböceğioğlu M. Basic life support, advanced life support for children. In: Karaböceğioğlu M, Yılmaz HL, Duman M, editors. Pediatric Emergency Medicine: Comprehensive and Easy Approach. 1st ed. Istanbul: Cilt II. Istanbul Tip Kitabevi; 2012. p. 83-105.
2. Kozaci N, Ay MO, İçme F, Aktürk A, Satar S. Are we successful in cardiopulmonary resuscitation? Cukurova Med J 2013;38:601-9.
3. Atkins DL, de Caen AR, Berger S, Samson RA, Schexnayder SM, Joyner BL Jr., et al. 2017 American Heart Association focused update on pediatric basic life support and cardiopulmonary resuscitation quality: An update to the American Heart Association Guidelines for cardiopulmonary resuscitation and emergency cardiovascular care. Circulation 2018;137:e1-6.
4. Lee J, Yang WC, Lee EP, et al. Clinical survey and predictors of outcomes of pediatric out-of-hospital cardiac arrest admitted to the emergency department. Sci Rep 2019;9:7032.
5. Law AK, Ng MH, Hon KL, Graham CA. Out-of-hospital cardiac arrest in the pediatric population in Hong Kong: A 10-year review at a University Hospital. Pediatr Emerg Care 2018;34:179-84.
6. Meyer L, Stubbs B, Fahrenbruch C, et al. Incidence, causes, and survival trends from cardiovascular-related sudden cardiac arrest in children and young adults 0 to 35 years of age: a 30-year review. Circulation 2012;126:1363-72.
7. Herlitz J, Svensson L, Engdahl J, et al. Characteristics of cardiac arrest and resuscitation by age group: an analysis from the Swedish cardiac arrest registry. Am J Emerg Med 2007;25:1025-31.
8. Park CB, Shin SD, Suh GJ, et al. Pediatric out-of-hospital cardiac arrest in Korea: A nationwide population-based study. Resuscitation 2010;81:512-7.
9. Meert KL, Telford R, Holubkov R, et al. Pediatric out-of-hospital cardiac arrest characteristics and their association with survival and neurobehavioral outcome. Pediatr Crit Care Med 2016;17e543-50.
10. Topijnan AA, Nadkarni VM, Berg RA. Cardiopulmonary resuscitation in children. Curr Opin Crit Care 2009;15:203-8.
11. Nadkarni VM, Larkin GL, Peberdy MA, Carey SM, Kaye W, Mancini ME, et al. First documented rhythm and clinical outcome from in-hospital cardiac arrest among children and adults. JAMA 2006;295:50-7.
12. Yurtseven A, Turan C, Akara F, Saz EU. Pediatric cardiac arrest in the emergency department: Outcome is related to the time of admission. Pak J Med Sci 2019;35:1434-40.
13. de Caen AR, Berg MD, Chameides L, et al. Part 12: Pediatric advanced life support: 2015 American Heart Association Guidelines Update for cardiopulmonary resuscitation and emergency cardiovascular care. Circulation 2015;132:S526-42.
14. Akbulfut F. Analysis of cardiac arrest cases between January 2007-June 2010 in Dokuz Eylül University Hospital Emergency Service. Dokuz Eylül Üniversitesi Hastanesi Acil Servis Ocak 2007-Haziran 2010 Yillar Arasında Kardiyak Arastı Kavaklarnın Analizi. In Turkish: Dissertation; 2011. p. 35.
15. Young KD, Seidel JS. Pediatric cardiopulmonary resuscitation: A collective review. Ann Emerg Med 1999;33:195-205.
16. Atkins DL, Everson-Stewart S, Sears GK, et al. Epidemiology and outcomes from out-of-hospital cardiac arrest in children: The resuscitation outcomes consortium epistry-cardiac arrest. Circulation 2009;119:1484-91.
17. Gerin RB, Osmond MH, Stiell IG, Nesbitt LP, Burns S, OPALS Study Group. What are the etiology and epidemiology of out-of-hospital pediatric cardiopulmonary arrest in Ontario, Canada? Acad Emerg Med 2006;13:653-8.
18. Donoghue AJ, Nadkarni V, Berg RA, et al. Out-of-hospital pediatric cardiac arrest: An epidemiologic review and assessment of current knowledge. Ann Emerg Med 2005;46:512-22.
19. Tam LP, Chan I. Paediatric out-of-hospital cardiac arrests: Epidemiology and outcome. Singapore Med J 2005;46:289-96.
20. Olsaweengeen TM, Caen CA, Mancini ME, et al. 2017 International consensus on cardiopulmonary resuscitation and emergency cardiovascular care science with treatment recommendations summary. Circulation 2017;136:e424-40.
21. Dennis M, Elder A, Semsarian C, Orchard J, Brouwer I, Puranik R. A 10-year review of sudden death during sporting activities. Heart Rhythm 2018;15:1477-83.
22. Pozam SE, Aydn ŞA. Evaluation of pediatric cardiopulmonary arrest cases in emergency service. JAEM 2015;14:57-9.
23. Disaster and Emergency Management Presidency of Turkey [In Turkish: Multeciler Denetleme ve Acil Derneği]. Number of Syrians in Turkey in September 2020. In Turkish: Türkiye’deki Suriyeli Sayısı Eylül 2020. Available from: https://multeciler.org.tr/turkiyedeki-suriyeli-sayisi/ . [Last accessed on 2020 May 13].
24. Association of Refugees in Turkey [In Turkish: Multeciler Derneği]. Number of Syrians in Turkey in September 2020. In Turkish: Türkiye’deki Suriyeli Sayısı Eylül 2020. Available from: https://multeciler.org.tr/turkiyedeki-suriyeli-sayisi/ . [Last accessed on 2020 May 13].
25. Baykan N, Aslaner MA. The use of emergency department and outpatient clinics by Syrian refugees. J Glob Health 2019;9:5.
26. Atalay E, Karakuş A, Usta G. Evaluation of Emergency Service Applications of Syrian Patients Under Eighteen Years Old Between 2012-2016: The Case of Hatay Province. [In Turkish: AFAD]. Disaster Report – Syria. [In Turkish:_AFAD Raporu – Suriye]. Available from: https://www.afad.gov.tr/afad-raporu-suriye. [Last accessed on 2020 May 13].
27. Disaster and Emergency Management Presidency of Turkey [In Turkish: Multeciler Denetleme ve Acil Derneği]. Number of Syrians in Turkey in September 2020. In Turkish: Türkiye’deki Suriyeli Sayısı Eylül 2020. Available from: https://multeciler.org.tr/turkiyedeki-suriyeli-sayisi/ . [Last accessed on 2020 May 13].
28. Oğuz S, Tuygun N, Polat E, Akça H, Karacan CD. War and Children: The Impact of the Syrian Civil War on a Children’s Emergency Service 750 km from the Border. [In Turkish: Savaz ve Çocuk: Suriye İç Savasının 750 km Uzakta Bir Çocuk Acil Servisine Etkisi.] J Pediatr Emerg Intensive Care Med. 2016;3:135-9.
29. Yurtseven A, Özcan G, Saz EU. Comparison of Syrian Patients Admitted to Pediatric Emergency Service and Turkish Patients: Ege University Experience.[In Turkish: Çocuk Acil Servis Başvurularının Değerlendirilmesi: Hatay İli Örneği.] J Pediatr Emerg Intensive Care Med. 2019;6:146-149.
30. Linton NM, Debolt C, Newman LP, Tasslimi A, Matheson J. Mortality rate and causes of death among refugees resettled in Washington State, 2006-2016. J Immigrant Minority Health 2020;22:3-9. [doi: 10.1007/s10903-019-00949-8].

Turkish Journal of Emergency Medicine - Volume 21, Issue 3, July-September 2021
30. Praveen K, Nallasamy K, Jayashree M, Kumar P. Brought in dead cases to a tertiary referral paediatric emergency department in India: A prospective qualitative study. BMJ Paediatr Open 2020;4:e000606.

31. Fink EL, Prince DK, Kaltman JR, et al. Unchanged pediatric out-of-hospital cardiac arrest incidence and survival rates with regional variation in North America. Resuscitation 2016;107:121-8.