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Intensive care outcomes of refugee patients in Turkey between 2013 and 2019: A retrospective descriptive study

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ABSTRACT

Objectives: To assess the outcomes of the intensive care of Syrian refugees under temporary protection (SRUTP).

Methods: The sample of the study was composed of 110 SRUTP patients who were treated at a tertiary intensive care unit (ICU) between 2013 and 2019 in Istanbul, Turkey. Baseline information and clinical data of the patients were collected by scanning the hospital's electronic database and clinical decision support system.

Results: The mean length of ICU stay was 97.6 (36.3-187.8) h. Among the patients, 71 (64.5%) had comorbid diseases, and ICU mortality was 40%. The median cost of health care for each patient was 2 144 (1 060-4 471) USD, and the total health care cost of all patients was 534 012USD.

Conclusions: Use of vasoactive drug, hemodialysis application, and low Glasgow Coma Scale scores are independent risk factors of the mortality. More researches are needed to clearly reveal the health and cost consequences of war.

KEYWORDS: Intensive care unit; Mortality; Refugee health; Syrian refugees; Health cost

1. Introduction

Breaking out in the early spring of 2011, the civil war in Syria has caused the migration of 5.6 million refugees to Turkey, Iraq, Lebanon, Jordan, and Egypt, and it is estimated that more than half of the refugees died. The Syrian Arab Republic is located in the Mediterranean Sea and the east coast of southern Turkey. Turkey opened the borders for the victims of the civil war, and in 2014 the Temporary Protection Regulation for refugees was enacted. After that, Turkey has taken Syrian refugees under temporary protection (SRUTP) according to the "Directive on the Syrian Arab Republic Citizens who incoming Turkey for collectively asylum and reception and housing of stateless persons residing in the Syrian Arab Republic". Registrations in 2019 were the most, recording 3.6 million Syrian refugees[1,2]. The Turkish government has to spend exceeded 10 billion USD on SRUTP. Cities with most refugee receptions include Şanlıurfa, Gaziantep, Hatay, Kilis, Mardin, Adana, Mersin, Adıyaman, Izmir, Istanbul. The concentration of the refugee in these cities has raised enormous challenges for the country to overcome[3]. Confronted with excessive concentration of SRUTP, the health, education, security, and other social service systems of these cites were overwhelmed[3,4], especially, Istanbul, the most densely populated area, has 495 783 recorded Syrian refugees. Considering that the health services for refugees are provided totally free, healthcare costs are rising continuously due to the rising numbers of refugees[2].

More than 80% of refugees' homes are severely damaged or completely ruined. More than 95% of refugees live on less than 150USD, and at least one family member of over 30% of the SRUTP died in the war. Furthermore, most refugees suffer from various acute and critical health problems[4]. Especially, the SRUTP residing outside the camps lead an extremely poor life with bad sanitary conditions. Its financial burden on the Turkey government has already reached huge levels[3,5-8]. In some regions, the health system is insufficient in terms of intensive and critical care physical resources and health professionals[3].

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This study aimed to form a basis for developing long-term refugee health policies for all relevant parties, especially Turkish authorities and UN organizations. We assessed the SRUTP patients' ICU outcomes between 2013 and 2019 in Istanbul, Turkey, to determine the factors affecting the mortality rate and to calculate the total health cost.

2. Materials and methods

2.1. Ethical consideration

Ethics committee approval and institutional approval (Protocol code: 2019/118-Decision number: 2019-05-21) were received from the Clinical Research Ethics Committee of Bakirkoy Dr. Sadi Konuk Training and Research Hospital. Written informed consent was also received from the patients or their families.

2.2. Study design

This retrospective descriptive study was conducted at the tertiary ICU of Bakırkoy Doktor Sadi Konuk Training and Research Hospital between 2013 and 2019 in Istanbul, Turkey. Providing health services to approximately one million people a year, this hospital has a capacity of 652 sickbeds. The ICU of the hospital has 27 sickbeds and admitted approximately 1 350 patients a year.

2.3. Sampling

During the study period, 8 076 patients were admitted to the ICU. Among them, 7 815 were Turkish citizens and 261 were foreigners. A total of 134 of the foreign patients were not refugees, and 77 were in the scope of health tourism and 57 were under social insurance. The remaining 127 refugee patients were under temporary protection, including 6 Afghan, 4 Iraqi, 5 Pakistani, and 112 Syrian. The data of 112 SRUTP patients were scanning in accordance with the purpose of the study. Due to missing data, 2 patients were excluded from the study. As a result, a total of 110 patients were included (Figure 1).

2.4. Data collection

Patients' demographic characteristics, diagnosis of admission and length of stay in ICU, the first calculated Glasgow Coma Scale, and acute physiology and chronic health evaluation (APACHE) Ⅱ, APACHE Ⅳ, simplified acute physiology score (SAPS) Ⅲ, sequential organ failure assessment (SOFA), therapeutic intervention scoring system (TISS) 28 scores, blood values of admission, treatments, discharge form, mortality and health costs were obtained from electronic database of the clinical decision support system. The data of health cost (the cost determined by social insurance agency included medication, medical consumables, blood and blood products, anesthesia, general clinic practices, monitoring, and lab costs) were ascertained *via* an extract of accounts available at the

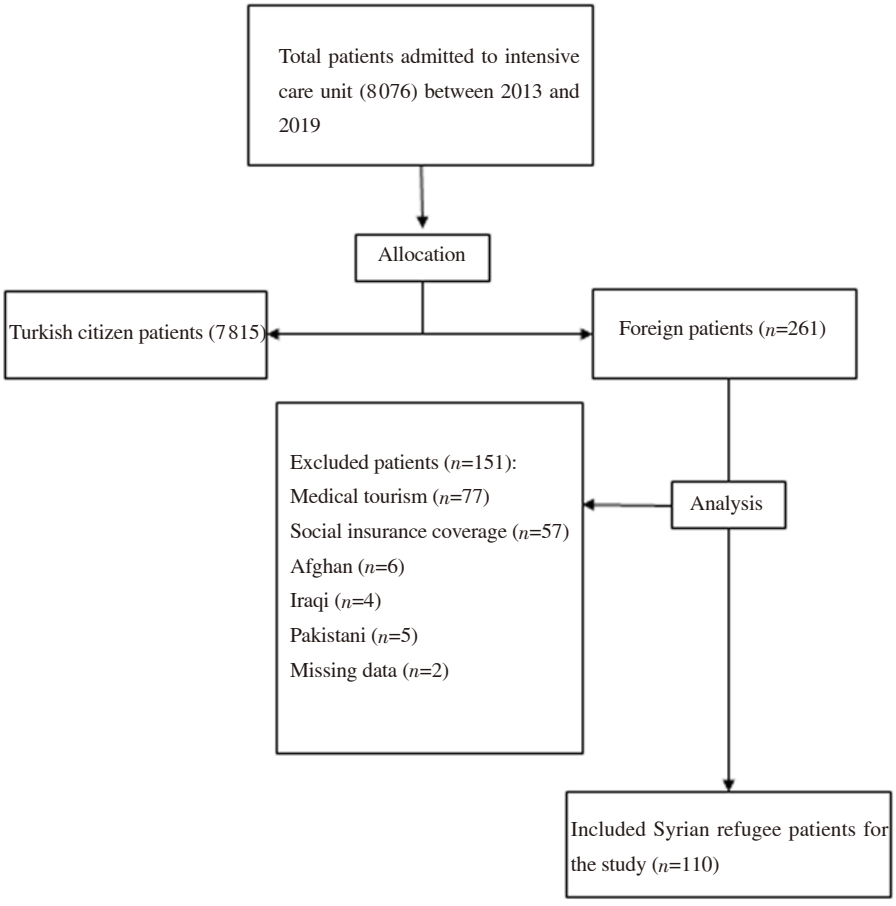

Figure 1. The study flowchart.

hospital database. The costs determined by social insurance agencies were taken into consideration. The electricity, water, natural gas expenses used by the hospital were not included in the calculation since they were not written as per patient expenses and these expenses were unavailable. To prevent the cost analysis from being affected by the currency fluctuations of United States dollar (USD)-Turkish lira (₺), the cost was accounted as ₺ and converted into USD based on the average January 2013-2019 Republic of Turkey Central Bank USD rate.

2.5. Statistical analysis

Data were analyzed using the Statistical Package for the Social Sciences (SPSS) 21.00 program. Independent variables included age, diagnosis, gender, and medical history, and dependent variables included ICU scores, length of stay in ICU, interventions, developed complications, clinical outcomes, and health cost. Descriptive statistics were given as frequency (n) and percentage (%), mean±standard deviation (SD), or median (interquartile range). Mann Whitney-U test was used to compare numerical data for the variables non normally distributed. A Chi-square test was used to compare categorical variables between groups. A logistic regression model was created by using the back screening method to determine the factors affecting mortality. The significant level of the test was set α=0.05.

3. Results

Among the 110 SRUTP patients, 52.7% (n=58) were male and 47.3% (n=52) were female. The mean age of the patients was (46.6±19.9) years old (95%CI: 42.8-50.4). The mean length of ICU stay was 97.6 (36.3-187.8) h. Fewer admissions occurred in 2013 [3 (2.7%)] and more in 2016 [32 (29.1%)] (Table 1).

Comorbid diseases were found in 64.5% of the patients (n=71), which included hypertension of 16.4% (n=18), diabetes mellitus of 15.5% (n=17), malignancies of 15.5% (n=17), cardiac diseases of 10.9% (n=12), and pulmonary diseases of 7.2% (n=8), in which 3 patients (2.7%) were diagnosed as active tuberculosis infection as shown in Table 1.

In terms of the sources of admission, 54 patients (49.1%) were admitted to ICU after operation; 30 patients (27.3%) from other wards and 21 patients (19.1%) from emergency department. As for the diagnosis, 16.3% (n=18) were diagnosed as physical trauma (traffic accident and gunshot/sharp object injury), 15.4% (n=17) as pulmonary diseases, 10% (n=11) as malignities, 9.1% (n=10) as obstetric diseases and finally 8.2% (n=9) as septicemia (Table 2).

Laboratory analysis and ICU scores are presented in Table 3. GCS score was 10±5 (95%CI: 9-11); APACHE Ⅱ score was 19±10 (95%CI: 17-21); APACHE Ⅳ score was 81±40 (95%CI: 74-89); SAPS Ⅲ score was 44±19 (95%CI: 40-48); SOFA score was 7±6 (95%CI: 6-8); and TISS28 scores was 21±9 (95%CI: 20-23).

Table 1. Demographic characteristics and comorbidity of the patients (n=110).

Parameters	N	Percentage (%)
Admission in different years		
2013	3	2.7
2014	11	10.0
2015	23	20.9
2016	32	29.1
2017	17	15.5
2018	24	21.8
Comorbidities		
Hypertension	18	16.4
Diabetes mellitus	17	15.5
Malignancy	17	15.5
Coronary artery disease	8	7.2
Congestive heart failure	4	3.6
Chronic obstructive pulmonary disease	5	4.5
Tuberculosis	3	2.7
Chronic renal failure	6	5.5
Cerebrovascular disease	5	4.5
Rheumatic disease	4	3.6
Hepatic disease	3	2.7
Drug use	2	1.8

Table 2. ICU admission sources and diagnosis of admission (n=110).

Parameters	N	Percent (%)
Departments		
Emergency department	21	19.1
Operating room	54	49.1
Other wards	30	27.3
External centers	5	4.5
Diagnosis of admission		
Traffic accident	14	12.7
Gunshot/sharp object injury	4	3.6
Pulmonary	17	15.5
Malignancy	11	10.0
Obstetric disease	10	9.1
Cranial disease	10	9.1
Sepsis	9	8.2
Renal disease	7	6.4
Cardiac disease	5	4.5
Metabolic disease	5	4.5
Gastrointestinal disease	4	3.6
Hemorrhage	4	3.6
Hepatic disease	2	1.8
Intoxication	2	1.8
Others	6	5.5

Medical interventions and treatments are shown in Table 4. During ICU stay, 70% (n=77) of the patients underwent artery cannulation; 70% (n=77) with mechanic ventilation (MV), 50.9% (n=56) with central venous catheter, 39.1% (n=43) with nasogastric tube and 30.9% (n=34) with dialysis catheter. During ICU follow-up acute kidney injury developed in 60% (n=66) of the patients, 20% (n=22) received replacement treatment, and 1.8% (n=2) underwent plasmapheresis.

Antimicrobial agents were used in 83.6% (n=92) of the patients. Septic shock alarm was detected in 48.2% (n=57) of the patients. Moreover, sedative agents were used in 76.4% (n=84) of the patients, and inotropic agents were used in 72.7% (n=80) of the patients. Blood products (whole blood transfusion, erythrocyte suspension, fresh frozen plasma, thrombocyte, cryoprecipitate)

were applied in 30.9% (*n*=34) of the patients, and 27.3% (*n*=30) were delivered erythrocyte suspension. MV was used to 70% (*n*=77) of the patient. The median duration of MV was 59.6 (24-106.6) h. In addition, 7.3% (*n*=8) received tracheostomy after weaning failure. A total of 50.9% (*n*=56) of remaining patients referred to other wards, 9.1% (*n*=10) transferred to other hospitals, and 40% (*n*=44) died (Table 4).

Median health cost was calculated as 2 144 (1 060-4 471) USD, and total health cost of all patients admitted to ICU during the study period (2013-2019) and included in the study was calculated as 534 012USD. No statistically significant difference was found between the patients' gender and health cost (P>0.05; Z=-0.222). The logistic regression model was applied to determine the factors affecting mortality, and the results show that vasoactive drug use, hemodialysis application, and admission GCS score were the independent risk factors for mortality. The use of vasoactive drugs (*OR*: 5.625%; 95%*CI*: 1.118-28.285) and hemodialysis application (*OR*: 5.275%; 95%*CI*: 1.383-20.120) increased the mortality 5-fold, and by contrast, high GCS score decreased the mortality (*OR*: 0.861; 95%*CI*: 0.748-0.990) (Table 5).

Table 3. Scores and laboratory parameters of patients after admission to the ICU (*n*=110).

Parameters	Mean±SD/ Median (Q1-Q3)	95*CI*%	Normal lab values
ICU scores			
GCS	10±5	9-11	
APACHE Ⅱ scores	19±10	17-21	
APACHE Ⅳ scores	81±40	74-89	
SAPS Ⅲ scores	44±19	40-48	
SOFA scores	7±6	6-8	
TISS28 scores	21±9	20-23	
Lab analysis			
Arterial blood pH (mmHg)	7.33±0.15	7.30-7.36	7.35-7.45
PaO_2 (mmHg)	86.4±55.8	75.8-96.9	75-100
$PaCO_2$ (mmHg)	39.3±12.1	37-41.6	35-45
HCO_3 (mmol/L)	20.6±5.7	19.6-21.7	22-26
Lactat (mmol/L)	2.1 (0.96-3.37)		0.5-2.0
Hemoglobin (g/dL)	10.3±2.5	9.9-10.9	10.8-14.2
Hematocrit (%)	31.6±7.8	30.1-33.1	35-45
PLT (10^3/μL)	226±135	201-252	155-366
WBC (10^3/μL)	15.6±8.3	14.1-17.2	3.70-10.01
Procalsitonin (μg/L)	1.10 (0.26-5.09)		<0.5
aPTT	29.9 (26-39)		27-45
INR	1.20 (1.08-1.47)		0.8-1.2
AST (IU/L)	39 (21-72)		0-35
ALT(IU/L)	26 (14-58)		0-35
Albumin (g/dL)	3.1±0.8	2.9-3.3	3.5-5.2
Creatine (mg/dL)	1.04 (0.66-1.89)		0.50-0.90

GCS: Glasgow Coma Scale; APACHE: Acute physiology and chronic health evaluation; SAPS: Simplified acute physiology score; SOFA: Sequential organ failure assessment; TISS: Therapeutic intervention scoring system; PaO_2: Partial pressure of oxygen; $PaCO_2$: Partial pressure of carbon dioxide; HCO_3: Bicarbonate; PLT: Platelets; WBC: White blood cell; aPTT: activated partial thromboplastin time; INR: International normalized ratio; AST: Aspartate aminotransferase; ALT: Alanine aminotransferase.

Table 4. Interventions, treatment, and outcomes of the patients (*n*=110).

Parameters	*N*	Percent (%)
Intervention		
Arterial cannulation	77	70.0
Mechanical ventilation	77	70.0
Central venous catheter	56	50.9
Nasogastric tube	43	39.1
Dialysis catheter	34	30.9
Tracheostomy	8	7.3
Treatments		
Antibiotic	92	83.6
Sedative agent	84	76.4
Inotropic agent	80	72.7
Steroid	16	14.5
Blood products	34	30.9
Erythrocyte suspension (Unit)	30	27.3
Fresh frozen plasma (Unit)	27	24.5
Thrombocyte (Unit)	14	12.7
Outcomes		
Transferring to other wards	56	50.9
Other	10	9.1
Death	44	40.0

Table 5. Logistic regression analysis of factors affecting mortality.

Parameters	*OR*	95*CI*%	*P*-value
Lactat	0.903	0.663-1.230	0.518
WBC (10^3/μL)	1.033	0.949-1.225	0.447
Vasoactive agent	5.275	1.383-20.120	0.015*
Hemodialiysis	5.625	1.118-28.285	0.036*
APACHE Ⅱ	0.842	0.703-1.009	0.062
APACHE Ⅳ	1.040	0.996-1.085	0.077
SAPS Ⅲ	1.043	0.981-1.110	0.177
SOFA	1.151	0.967-1.317	0.113
GCS	0.861	0.748-0.990	0.035*

WBC: White blood cell; APACHE: Acute physiology and chronic health evaluation; SAPS: Simplified acute physiology score; SOFA: Sequential organ failure assessment; GSC: Glasgow Coma Scale; *P<0.05.

4. Discussion

According to the present study, the most common reason for admission to ICU among SRUTP patients is physical trauma (motor vehicle accident the most). Similarly, a study carried out with 280 SRUTP patients in Turkey showed the most common cause of admission to ICU was physical trauma (gunshot injury) [9]. Another study of 707 SRUTP patients examined the results of trauma and surgery retrospectively and found that most patients were hospitalized due to gunshot injury[10].

Pulmonary diseases were found to be the second common reason for ICU admission of SRUTP patients. Similar to our study, a study also showed that the patients were admitted to ICU for chronic obstructive pulmonary disease (asthma, bronchiectasis, chronic bronchitis, emphysema) and pneumonia[11]. Pfortmueller *et al.* found that the most common disease among Syrian refugees is pulmonary diseases[12]. In addition, our study found 10% of the patients had malignancies. A study with a similar sample found

10.8% of hematologic malignancy in ICU patients[11].

Comorbid diseases are important factors affecting long-term outcomes in critical patients[13]. Hypertension was the most common comorbid disease of SRUTP patients in ICU. In other studies conducted with SRUTP patients in ICU, it found that comorbid diseases such as cerebrovascular diseases, hypertension, diabetes mellitus, various malignancies, and cardiac diseases are common[4,11].

Some countries with low tuberculosis incidence experience a significant increase in tuberculosis incidence due to the increasing numbers of refugees and migrants from tuberculosis endemic countries[14]. In the present study, 2.7% (n=3) of patients were diagnosed as active tuberculosis. A study displayed tuberculosis (5.4%) and tuberculosis meningitis (2.7%) among SRUTP patients in ICU. Similarly, tuberculosis cases caused by the refugee and immigrant were encountered in different regions of Spain with a rate of 22%-28%[15-17]. Tuberculosis cases caused by immigrant and refugees were found with a rate of 30% in Norway (because of the former Yugoslavia and Somalis), 56% in Sweden (caused only by Somalis), 46% in Italy and 35% in France[18-20]. Tuberculosis cases caused by 37% asylum seekers and 20% other immigrants were encountered in Germany[21].

This study found that during the ICU stay, the majority of patients underwent invasive MV and arterial cannulation, which is similar to other studies[11,22,23].

A study assessed the ICU scores of 1 896 ICU patients, and the results showed the mean APACHE Ⅱ scores of 25, APACHE Ⅳ scores of 103, and SAPS scores of 60[24]. In another study, the APACHE Ⅱ scores of ICU patients was 23.11[11]. In the present study, the low scores may be due to the younger age of the patients. Besides, the mean length of ICU stay in the present study was 97.6 (36.3-187.8) h. It was found that in other studies, the ICU stay varied between 4.7-12 d[9,10,24].

The present study found that vasoactive agents such as noradrenaline, dopamine, and adrenaline were applied to the patients. Other studies found different applications of noradrenaline, dopamine, adrenaline, H_2 receptor blockers, positive inotropic agents, and corticosteroid therapy[11,25].

In this study, the ICU mortality of SRUTP patients was 40%. Other studies determined that ICU mortality varies between 31.2% and 59.5%[9-11,24,26]. The high ICU mortality in this study may be due to the higher incidence of severe and critical diseases. In this study, the risk of mortality of the SRUTP patients who needed vasopressor agents was 5.3-fold higher, and the mortality risk increased by 5.6 times in the patients who needed hemodialysis treatment. In addition, high GCS score during admission resulted in a lower risk of mortality. A study on 186 Syrian patients with cranial gunshot injures also proved the GCS score was associated with the mortality (low GCS score was associated with increased mortality risk)[27].

About refugees' ICU health costs, it was found that the total health cost of Syrian refugees was 883 million USD as of 2015. Since 2011, Republic of Turkey state that spending 20 billion USD (10 billion USD has been spent by the governmental and 10 billion USD has been spent by non-government organizations) to the needs of Syrian refugees[28]. According to another study, the average health cost is 1 500USD per person[9], while the number in this study was approximately 2 264USD. Another study examined the effect of the Syrian civil war on the emergency department and health cost with 482 patients and revealed the average cost as 2 068USD per case[29]. In the present study, the median health cost was calculated as 2 264USD. The difference in cost might be the result of currency fluctuations of USD.

The results of the study cannot be generalized because it was conducted at a hospital in a single metropolitan city. It did not provide a comparison between other healthcare disciplines neither. For an appropriate comparison, similar or different design studies in the countries and cities with Syrian refugees need to be conducted, and further studies that revealed the condition of refugees living in various countries, including Turkey would be of great help to health practitioners and policymakers at all levels.

Conflict of interest statement

The authors report no conflict of interest.

Authors' contributions

Study design: M.S.S., S.A., N.S., Z.Ç., G.S.; Data collection and analysis: M.S.S., S.A., N.S., Z.Ç., G.S.; Manuscript writing: M.S.S., S.A., N.S., Z.Ç., G.S.; Statistical expertise: M.S.S.; Critical revision for important intellectual content: M.S.S., S.A., Z.Ç.; Contributed to the final version of the manuscript: M.S.S., N.S.

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