Turk J Intensive Care 2021;19:62-70
DOI: 10.4274/tybd.galenos.2020.70894

ORIGINAL RESEARCH / *ÖZGÜN ARAŞTIRMA*

Yavuz Orak,
Şehnaz Pelin Tanır,
Hatice Tuğba Güngör,
Sondemet Çetin,
Filiz Orak,
Fatih Mehmet Yazar,
Ömer Faruk Boran,
Adem Doğaner

Reasons for Hospitalisation, Sepsis Development and Mortality Among Syrian Patients in an Intensive Care Unit

Suriyeli Hastaların Yoğun Bakım Ünitesinde Yatış Nedenleri, Sepsis Gelişimi ve Mortalite

Received/Geliş Tarihi : 12.09.2019
Accepted/Kabul Tarihi : 15.03.2020

Yavuz Orak, Ömer Faruk Boran
Kahramanmaraş Sütçü İmam University Faculty of Medicine, Department of Anesthesiology and Reanimation, Kahramanmaraş, Turkey

Şehnaz Pelin Tanır, Hatice Tuğba Güngör, Sondemet Çetin
Kahramanmaraş Necip Fazıl City Hospital, Clinic of Anesthesiology and Reanimation, Kahramanmaraş, Turkey

Filiz Orak
Kahramanmaraş Sütçü İmam University Faculty of Medicine, Department of Microbiology, Kahramanmaraş, Turkey

Fatih Mehmet Yazar
Kahramanmaraş Sütçü İmam University Faculty of Medicine, Department of General Surgery, Kahramanmaraş, Turkey

Adem Doğaner
Kahramanmaraş Sütçü İmam University Faculty of Medicine, Department of Biostatistics and Medical Informatics, Kahramanmaraş, Turkey

Yavuz Orak MD, (✉),
Kahramanmaraş Sütçü İmam University Faculty of Medicine, Department of Anesthesiology and Reanimation, Kahramanmaraş, Turkey

E-mail : dryavuzorak@hotmail.com
Phone : +90 344 300 33 43
ORCID ID : orcid.org/0000-0002-8356-6223

ABSTRACT *Objective:* This study aims to investigate the reasons for the hospitalisation of Syrian patients in an intensive care unit (ICU), the development of sepsis, relevant causes of pathogens and mortality rates.
Materials and Methods: We conducted this study between 2012 and 2016. Patient information was analysed retrospectively from records and files in the information system.
Results: During the study period, 139 Syrian patients were hospitalised in an ICU. The most common ICU diagnoses were respiratory tract infection (29 patients: 20.9%) and trauma (26 patients: 18.7%). Of these patients, 35 were diagnosed with sepsis during their treatment in the ICU. *Acinetobacter baumannii* and *Escherichia coli* were isolated in the culture of the patients with sepsis (17, 12, respectively). *A. baumannii* was most common in tracheal cultures and *E. coli* in urine cultures. In addition, seven patients were diagnosed with sepsis on their first admission to the hospital. H1N1 was detected in two patients, *Streptococcus pneumoniae* in three, *Haemophilus influenzae* in one, and *Staphylococcus aureus* and aspergilloma in another patient. While 45 of 139 patients died, 28 of 35 patients diagnosed with sepsis died. Acute Physiologic Assessment and Chronic Health Evaluation II scores, the duration of mechanical ventilation, the number of days spent in the ICU was all higher in the deceased patients than in the surviving patients ($p<0.001$, $p<0.001$, $p<0.001$, respectively).
Conclusion: Respiratory diseases were the most common causes of Syrian patients' hospitalisation in the ICU and for developing sepsis. For these patients, sepsis remained an important factor for mortality.
Keywords: Syrian patients, sepsis, mortality, intensive care unit

ÖZ *Amaç:* Suriyeli hastaların yoğun bakım ünitesine (YBÜ) yatış nedenlerini, sepsis gelişimlerini, sepsise neden olan patojenleri ve hastaların ölüm oranlarını araştırmaktır.
Gereç ve Yöntemler: Çalışmamız 2012-2016 tarihleri arasında YBÜ'de yapıldı. Hastane bilgi sistemindeki kayıt ve dosyalar geriye dönük olarak analiz edildi.
Bulgular: Çalışma süresi içinde 139 Suriyeli hasta YBÜ'ye yatırıldı. En sık YBÜ'ye yatış tanıları solunum yolu enfeksiyonu (29 hasta: %20,9) ve travma (26 hasta: %18,7) idi. Bu hastaların yoğun bakım tedavileri sırasında 35 hasta sepsis tanısı aldı. Sepsis tanısı alan hastaların kültürlerinin 17'sinde *Acinetobacter baumannii* ve 12'sinde *Escherichia coli* üredi. *A. baumannii* trakea kültürlerinde, *E. coli* idrar kültürlerinde en yaygındı. Ayrıca, yedi hastaya hastaneye müracaat ettiği ilk anda sepsis tanısı kondu. Bu hastalardan 2'sinde H1N1, 3'ünde *Streptococcus pneumoniae*, 1'inde *Haemophilus influenzae*, 1'inde *Staphylococcus aureus* ve aspergilloma saptandı. YBÜ'de yatan 139 hastanın 45'i ölmüş iken sepsis tanısı alan 35 hastanın 28'i öldü. Akut Fizyoloji ve Kronik Sağlık Değerlendirmesi II skorları, mekanik ventilasyon süresi, YBÜ yatış süresi ölenlerde sağ kalan hastalara göre daha yüksekti ($p<0,001$, $p<0,001$, $p<0,001$).
Sonuç: Suriyeli hastalarda en sık YBÜ yatış ve sepsis gelişme nedeni solunum yolu enfeksiyonlarıydı. Bu hastalarda sepsis mortalite için önemli bir faktördü.
Anahtar Kelimeler: Suriyeli hastalar, sepsis, mortalite, yoğun bakım ünitesi

Introduction

More than 43,3 million people worldwide are fleeing war, and there are some political or ethnic pressures regarding taking refugees in another country (1,2). The war in Syria is tragically deadly and devastating enough to affect not only Syria's neighbors; Lebanon, Egypt, Iraq, and Turkey, but also European nations bordering Turkey (3,4). Since March, 2016, Turkey, with 2,7 million Syrians, has been one of the countries who have hosted the most refugees (3-5). There are approximately 300,000 refugees living in camps in the vicinity of Turkish cities near the Syrian border (Şanlıurfa, Gaziantep, Kilis, Hatay, Kahramanmaraş, Adıyaman, Adana, and Osmaniye). Additionally, there are about 2,440,000 refugees living outside the camps, who have spread from the south of Turkey to her central and western cities, like İstanbul, Ankara, and İzmir (4-6).

The disease profiles of refugees, who were at first exposed to traumatic injuries as a result of violent conflicts, then made dangerous journeys to other countries. They would take refugees in different from the disease profiles of the local people, both because of regional differences in some infectious diseases and insufficient living conditions in the nations to which the refugees had migrated (7,8).

In studies conducted in the early stages of the migration, the most important reasons for hospitalization in the intensive care units (ICUs) were traumatic pathologies and high-velocity gunshot wounds (9,10). Later, an increase was reported in reasons like respiratory system, cardiac, and tumoral pathologies (11,12). As far as we know, there are no studies to date on the pathogen profiles and sepsis rates of Syrian patients in the ICUs.

The aim of this study was to perform a general evaluation of the indications of hospitalization among Syrian patientsin ICU, and to analyze these patients' rates of sepsis development, effective pathogens, and mortality rates and causes.

Materials and Methods

The study was carried out between June 1, 2012, and December 31, 2016, in two separate 14-bed Anesthesiology and Reanimation Intensive Care Units (ARICUs). Approval for the study (decision no: 04, date: 05.04.2017) was obtained from Kahramanmaraş Sütçü İmam University's Ethics Committee.

Of the 4,912 patients hospitalized in the units, 300 (6.1%) were Syrian. A total of 139 (46.3%) patients whose records could be accessed were included in the study. Patient information was analyzed retrospectively from the records and patient files in the hospital's information management system.

There were a plethora number of factors for the evaluation stage. Namely, the following were considered for this purpose: patients' ages, gender, diagnoses at hospitalization, comorbid diseases, mechanical ventilation (MV) and number of days on MV, surgeries, diagnoses of sepsis, presence of sepsis originating from intensive care, areas from which cultures were obtained, microorganisms found, antibiotics used, number of days in the ICU, mortality rates, and Acute Physiologic Assessment and Chronic Health Evaluation (APACHE) II scores. For the patients who developed sepsis, the following data were recorded upon admission: The blood glucose level, the Sequential Organ Failure Assessment (SOFA) score and presence or absence of sepsis, the number of days before sepsis set in, the neutrophil/lymphocyte ratio, and the present microorganisms and the parts of the body where they were being produced.

Definitions

In the study, patients were considered septic when they had SOFA scores of 2 or more and septic pathogens were found, as defined in the international guidelines of the Surviving Sepsis Campaign.

A community acquired infection was detected within the first 48-72 hours of hospitalization or acquired in daily life without significant immune deficiency (11).

Statistical Analysis

The SPSS 24.0 program (IBM Corporation, Armonk, New York, United States) was used in analysis of the variables. The Shapiro-Wilk test was used to determine the normal distribution of the data. The Mann-Whitney U test was used with the Monte Carlo simulation technique in the comparison of two independent groups with regard to the quantitative data. For comparing categorical variables with one another, Pearson's chi-squared test, Fisher's Exact test, and the Fisher-Freeman-Halton test were performed with the Exact and Monte Carlo Simulation techniques. Column ratios were compared to one another and expressed in accordance with the Benjamini-Hochberg adjusted p-values. An odds ratio with a 95% confidence interval was used to show the odds of an outcome occurring in

the presence of an exposure as compared to the odds of the outcome occurring in the absence of the exposure. Quantitative variables are shown in the tables as median (minimum/maximum), and categorical variables as n (%). Variables were examined at a confidence level of 95%, and a p-value was accepted as less than 0.05.

Results

General Findings

The mean age of the 139 patients who were included in the study was 46 (1-90), and 90 (647%) of them were male. Diagnoses at the initial hospitalization included 20 patients (14.4%) with gunshot wounds and 29 (20.9%) with respiratory tract infections. The patients were separated into two groups; survivor and deceased. A total of 45 (32.4%) of the patients died in the ARICU.

APACHE-II scores, the length of time connected to MV, and the number of days hospitalized in intensive care were all found to be greater in the deceased patients than in the living patients ($p<0.001$, $p<0.001$, and $p<0.001$, respectively). Twenty-three (24.5%) of the survivors were trauma patients, and 16 (35.5%) of the deceased were respiratory disease patients. Surgery had been performed on 51 (54.2%) of the surviving patients and on 16 (17%) of the deceased ones ($p=0.047$). The distributions of the patients according to their diagnoses and socio-demographic characteristics are given in Table 1.

In 43 patients (30.9%), the most common comorbid diseases after their initial diagnosis was cardiac disease (Table 2).

Antimicrobial Therapy, Infection Type and Sepsis Findings

Of the living patients, 62 (66%) received single antibiotics while 27 (60%) of the deceased patients received multiple antibiotics ($p<0.001$). The blood cultures were positive in 8 (8.5%) of the surviving patients and the trachea cultures were positive in 5 (5.3%). In addition, 15 (33.3%) of the deceased patients' blood cultures were positive, as were 18 (40%) of their trachea cultures ($p<0.001$ and $p<0.001$, respectively) (Table 3).

While 89 (48.9%) of all the patients did not produce microorganisms, *Acinetobacter baumannii* was found in 17 (9.3%) and *Escherichia coli* in 15 (8.2%). Of the patients who developed sepsis, 17 (23.6%) produced *A. baumannii* and 12 (16.7%) *E. coli. A. baumannii* was detected most frequently in trachea cultures and *E. coli* in urine cultures (Table 4).

The 35 patients with sepsis were divided into two groups: Those who survived (n=7) and those who did not (n=28). The patients' clinical information is given in Table 5.

Ten of the septic patients (28.6%) had diseases of the respiratory system, seven (20%) had gunshot injuries, and five (14.3%) were diagnosed with trauma (Table 6).

β-lactam/β-lactamase inhibitor-type antibiotics were used on 65 (28.6%) of the patients, while 2nd, 3rd, and 4th generation cephalosporins were used on 43 (18.9%). Of the patients with sepsis, carbapenems were used on 17 (19.5%), colistin on 16 (18.4%), and tigecycline on 11 (12.6%) patients (Table 7).

A Community-acquired Infection

Seven patients were diagnosed with sepsis at the time of hospitalization. Oseltamivir treatment was begun on two patients with initial diagnoses, later confirmed, of H1N1. *Streptococcus pneumoniae* was found in three patients, *Haemophilus influenzae* in one, and *Staphylococcus aureus* and aspergilloma in one.

Discussion

In our study, we investigated the reasons for hospitalization, the sepsis development rates, the pathogens causing sepsis, and the mortality rates and causes for Syrian patients in ICU.

In the early period of the studies relating to the Syrian civil war, patients underwent surgery due to trauma (9,10). In a study evaluating arrivals of both refugees and locals at emergency service units, it was reported that refugees' medical emergencies included high rates of many types of trauma, especially of the head, neck, and extremities, as compared to those rates for local residents (9). Another study showed that the most common surgical site regions were head and neck (52.7%), followed by the thorax and abdomen (27.8%), and multiple-system injuries (13.8%) (10). In another study on trauma, 24.2% of the patients had head and neck trauma, and 15.3% had chest, abdomen and back trauma (13). Duramaz et al. (14) reported that injuries were more common in lower extremities, upper extremities and axial skeleton. Blunt trauma was significantly higher in upper extremity injuries compared to other types of injuries. In a study conducted in central Europe, the most common reasons for admission among Syrian patients were

surgery (43.3%), medical (36.5%) and psychiatric (15.6%). In addition, the most common acute infectious diseases (43.9%) were respiratory, gastrointestinal and urinary tract infections (15).

In our study, it was seen that the most important causes of hospitalization were pathologies of the respiratory system (20.9%) trauma (18.7%) and gunshot wound (14.4%). Besides, 67 (48.2%) of our patients underwent surgical intervention. 44 (65.7%- multiple injuries) of patients had thorax and abdominal injuries. It was further noted that tumoral causes, which were not mentioned in the literature, accounted for as high a rate as 10.1%. In the present study,

Table 1. Surviving and deceased patients' demographic and clinical characteristics

		Surviving (n=94)	Deceased (n=45)	Total (n=139)	p	OR (95% CI)
Age	Median (min/max)	43 (1/87)	54 (3/90)	46 (1/90)	0.068	-
APACHE-II	Median (min/max)	11 (6/29)	29 (9/38)	13 (6/38)	<0.001	-
DMV	Median (min/max)	0 (0/43)	7 (0/270)	1 (0/270)	<0.001	-
DIC	Median (min/max)	3 (1/46)	9 (1/270)	4 (1/270)	<0.001	-
Sex						
Female	n (%)	36 (38.3)	12 (26.7)	48 (34.5)	0.189	-
Male	n (%)	58 (61.7)	33 (73.3)	91 (65.5)		
Province-referral from						
Patient from other province	n (%)	7 (7.4)	5 (11.1)	12 (8.6)	0.588	-
Same-province patient	n (%)	78 (83.0)	34 (75.6)	112 (80.6)		
Hatay State Hospital	n (%)	9 (9.6)	6 (13.3)	15 (10.8)		
Diagnosis						
Gunshot wound	n (%)	11 (11.7)	9 (20.0)	20 (14.4)	0.004	-
Respiratory disease	n (%)	13 (13.8)	16 (35.6)	29 (20.9)		3.4 (1.5-8.01)
Renal disease	n (%)	0 (0.0)	2 (4.4)	2 (1.4)		-
Trauma	n (%)	23 (24.5)	3 (6.7)	26 (18.7)		4.5 (1.3-16.02)
Cardiac disease	n (%)	5 (5.3)	5 (11.1)	10 (7.2)		-
Cancer	n (%)	12 (12.8)	2 (4.4)	14 (10.1)		-
Cerebrovascular disease	n (%)	6 (6.4)	3 (6.7)	9 (6.5)		-
Intoxication	n (%)	6 (6.4)	1 (2.2)	7 (5.0)		-
Gastrointestinal disease	n (%)	10 (10.6)	2 (4.4)	12 (8.6)		-
Other	n (%)	8 (8.5)	2 (4.4)	10 (7.2)		-
MV usage						
No	n (%)	55 (58.5)	2 (4.4)	57 (41.0)	<0.001	-
Yes	n (%)	39 (41.5)	43 (95.6)	82 (59.0)		30.3 (6.9-132.6)
Surgery						
No	n (%)	43 (45.7)	29 (64.4)	72 (51.8)	0.047	-
Yes	n (%)	51 (54.3)	16 (35.6)	67 (48.2)		2.1 (1.03-4.5)
Anatomical region injured						
Head	n (%)	6 (11.8)	6 (37.5)	12 (17.9)	0.091	-
Thorax and abdomen	n (%)	36 (70.6)	8 (50.0)	44 (65.7)		
Extremities	n (%)	9 (17.6)	2 (12.5)	11 (16.4)		

Mann-Whitney U test (Monte Carlo), Pearson's chi-squared test (Exact/Monte Carlo), Fisher-Freeman-Halton test (Monte Carlo), Fisher Exact test (Exact), odds ratio (95% confidence interval). OR: odds ratio, CI: confidence interval, min: minimum, max: maximum, DMV: days on mechanical ventilator, DIC: days in intensive care, MV: mechanical ventilation

Table 2. Comorbid diseases	
	n=163 (%) *X
None	67 (41.1)
Cardiac diseases	43 (26.4)
Diabetes mellitus	17 (10.4)
Renal diseases	15 (9.2)
Respiratory diseases	10 (6.1)
Cerebrovascular diseases	6 (3.7)
Other	5 (3.1)
Total	163
*One patient has more than one disease	

respiratory failure was found to be the most important cause (35.6%) of mortality. In the diagnostic-based evaluation of the patients, it was observed that the most septic complications were in patients with respiratory failure, and it was thought that this had an effect on the development of mortality (28%). In the correlation analysis we performed, the most important factor affecting mortality was the development of sepsis. In all Syrian patients, the overall mortality rate was 32.37%, while the same rate in Syrian patients with sepsis was 80%.

One of the aims of our study was the evaluation of the mortality and of the pathogens that cause sepsis development

Table 3. Evaluation of cultures taken from surviving and deceased patients						
		Surviving (n=94)	Deceased (n=45)	Total (n=139)	p	OR (95% CI)
Culture taken from						
None taken	n (%)	77 (81.9)	14 (31.1)	91 (65.5)	<0.001	-
Tracheal aspirate	n (%)	2 (2.1)	8 (17.8)	10 (7.2)		22 (4.2-114.6)
Blood	n (%)	5 (5.3)	7 (15.6)	12 (8.6)		7.7 (2.1-27.7)
Urine	n (%)	0 (0.0)	2 (4.4)	2 (1.4)		-
Injury site	n (%)	6 (6.4)	3 (6.7)	9 (6.5)		-
Two or more regions	n (%)	4 (4.3)	11 (24.4)	15 (10.8)		15.1 (4.2-54.3)
Microorganism found						
None	n (%)	74 (78.7)	15 (33.3)	89 (64.0)	<0.001	-
Single microorganism	n (%)	10 (10.6)	15 (33.3)	25 (18.0)		7.7 (2.9-20.4)
Multiple microorganisms	n (%)	10 (10.6)	15 (33.3)	25 (18.0)		7.7 (2.9-20.4)
Antibiotic administered						
None	n (%)	12 (12.8)	1 (2.2)	13 (9.4)	<0.001	-
Single antibiotic	n (%)	62 (66.0)	17 (37.8)	79 (56.8)		3.2 (0.4-27.1)
Multiple antibiotics	n (%)	20 (21.3)	27 (60.0)	47 (33.8)		16.2 (1.9-135.01)
Urine culture						
Negative	n (%)	89 (94.7)	38 (84.4)	127 (91.4)	0.056	-
Positive	n (%)	5 (5.3)	7 (15.6)	12 (8.6)		-
Blood culture						
Negative	n (%)	86 (91.5)	30 (66.7)	116 (83.5)	<0.001	-
Positive	n (%)	8 (8.5)	15 (33.3)	23 (16.5)		5.4 (2.1-13.9)
Tracheal culture						
Negative	n (%)	89 (94.7)	27 (60.0)	116 (83.5)	<0.001	-
Positive	n (%)	5 (5.3)	18 (40.0)	23 (16.5)		11.9 (4.02-34.9)
Injury site culture						
Negative	n (%)	85 (90.4)	42 (93.3)	127 (91.4)	0.751	-
Positive	n (%)	9 (9.6)	3 (6.7)	12 (8.6)		-
Sepsis						
No	n (%)	86 (91.5)	19 (40.4)	104 (75.5)	<0.001	-
Yes	n (%)	7 (7.5)	28 (59.6)	35 (24.5)		14.7 (5.8-37.5)
Mann-Whitney U test (Monte Carlo), Pearson's chi-squared test (Exact/Monte Carlo), Fisher-Freeman-Halton test (Monte Carlo), Fisher Exact Test (Exact), odds ratio (95% confidence interval). OR: odds ratio, CI: confidence interval						

in Syrian patients. In a multicenter international study, the hospital mortality rate of sepsis patients was found to be 47.2% in Africa and 13.1% in North America (16). Another study showed that mortality rate of severe sepsis was 36.7 % in South/Central America and 44% Eastern Europe (17). In Uganda, hospital mortality associated with sepsis was 43% (18), in Thailand 50% (19). In a study conducted in an ICU in Turkey, the sepsis mortality rate was reported as 87.3%. The most commonly isolated agent in the development of sepsis, according to that study, was Gr (-) bacteria, at 65.9 % (20). In our study, it was seen that the sepsis mortality rates of the Syrian patients were similar to those of the local population (80%).

The most common pathogen among sepsis patients was *A. baumannii*, the second most common was *E. coli*. While death from sepsis in high-income countries has been 30%-40% in the last decade and is steadily falling (21,22), the mortality rate in low-income regions of the world has risen as high as 80% (23-26). In a multicenter study conducted in Turkey, the mortality was found to be very high among patients with sepsis and septic shock in the ICU (55.7% and 70.4%, respectively). The most isolated microorganism was *Acinetobacter* spp. (33.7%) and approximately 74.8% of Acinetobacters were resistant to carbapenems (27). In our study, the rate of *Acinetobacter* spp. in all Syrian patients was 9.3% and 23.6% in patients with sepsis. Carbapenem use rates were 11.9% in all Syrian patients and 19.5% in sepsis patients.

In the study of Turktan et al. (11), 37 patients in an ICU were hospitalized because of infection. The most common community infection was pneumonia (49%) and urinary infection (16.3%). In eight of them, the infection developed as a result of community-acquired microorganisms, the most important of which was *Mycobacterium tuberculosis*. This situation was thought to have been caused by the difficulty of the refugees' living conditions, and high population density of their living quarters. *E. coli* was the second most common pathogen reported in that study (11). In our study, although *M. tuberculosis* was not observed as a causative pathogen, it was noted that at the time of admission, seven patients had

Table 4. Distribution of microorganisms detected, by culture type

	All patients n=139	Sepsis patients n=35	Blood culture	Tracheal culture	Urine culture	Injury site culture
Microorganism	**n (%)**	**n (%)**	**n (%)**	**n (%)**	**n (%)**	**n (%)**
None detected	89 (48.9)	-	-	-	-	-
Acinetobacter baumannii	17 (9.3)	17 (23.6)	5 (17.8)	9 (34.7)	3 (21.4)	3 (42.8)
Streptococcus pneumoniae	3 (1.6)	3 (4.2)	2 (7.1)	0 (0.0)	1 (7.1)	0 (0.0)
Candida fungus	9 (4.9)	8 (11.1)	4 (14.3)	2 (7.7)	2 (14.4)	0 (0.0)
MSSA	6 (3.3)	4 (5.6)	2 (7.1)	1 (3.8)	1 (7.1)	0 (0.0)
CNS	12 (6.5)	5 (6.9)	4 (14.3)	0 (0.0)	1 (7.1)	0 (0.0)
Escherichia coli	15 (8.2)	12 (16.7)	1 (3.6)	3 (11.5)	6 (42.9)	2 (28.6)
Klebsiella pneumoniae	8 (4.4)	7 (9.7)	0 (0.0)	6 (23.2)	0 (0.0)	1 (14.3)
VRE	1 (0.6)	1 (1.4)	1 (3.6)	0 (0.0)	0 (0.0)	0 (0.0)
Stenotrophomonas maltophilia	4 (2.2)	4 (5.5)	3 (10.7)	1 (3.8)	0 (0.0)	0 (0.0)
Pseudomonas aeruginosa	7 (3.9)	4 (5.5)	1 (3.6)	2 (7.7)	0 (0.0)	1 (14.3)
Enterococcus	4 (2.2)	3 (4.1)	2 (7.1)	1 (3.8)	0 (0.0)	0 (0.0)
Haemophilus influenzae	1 (0.6)	1 (1.4)	0 (0.0)	1 (3.8)	0 (0.0)	0 (0.0)
Aspergillus fumigatus	1 (0.6)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Enterobacteriaceae	2 (1.1)	1 (1.4)	1 (3.6)	0 (0.0)	0 (0.0)	0 (0.0)
MRSA	1 (0.6)	1 (1.4)	1 (3.6)	0 (0.0)	0 (0.0)	0 (0.0)
Viruses (H1N1)	2 (1.1)	1 (1.4)	1 (3.6)	0 (0.0)	0 (0.0)	0 (0.0)
Toplam	182/100	72/100	28/100	26/100	14/100	7/100

MSSA: methicillin-susceptible *Staphylococcus aureus*, CNS: coagulase-negative staphylococci, VRE: vancomycin-resistant enterococci, MRSA: methicillin-resistant *Staphylococcus aureus*

Table 5. Evaluation of sepsis patients' data					
		Surviving (n=7)	Deceased (n=28)	Total (n=35)	p
Age	Mean ± SD	41.29±19.11	49.93±22.24	48.20±21.67	0.290
Day sepsis developed (+)	Median (min/max)	7 (2/18)	5 (1/75)	5 (1/75)	0.774
NLR	Median (min/max)	9.63 (5.75/150)	11.50 (0.67/110.34)	11.34 (0.67/150)	1
NLR %	Median (min/max)	9.65 (6.58/15.68)	11.19 (2.10/47.25)	11.01 (2.10/47.25)	0.749
Blood glucose value at admission	Median (min/max)	145 (83/229)	194 (73/475)	175 (73/475)	0.177
SOFA score	Median (min/max)	5 (2/5)	5 (2/10)	5 (2/10)	0.214
DIC	Median (min/max)	31 (11/46)	17 (2/270)	17 (2/270)	0.121
Sex					
Female	n (%)	2 (28.6)	8 (28.6)	10 (28.6)	1
Male	n (%)	5 (71.4)	20 (71.4)	25 (71.4)	
ARF					
No	n (%)	5 (71.4)	14 (50.0)	19 (54.3)	0.415
Yes	n (%)	2 (28.6)	14 (50.0)	16 (45.7)	
Blood culture					
Negative	n (%)	3 (42.9)	11 (39.3)	14 (40.0)	1
Positive	n (%)	4 (57.1)	17 (60.7)	21 (60.0)	
Tracheal culture					
Negative	n (%)	3 (42.9)	11 (39.3)	14 (40.0)	1
Positive	n (%)	4 (57.1)	17 (60.7)	21 (60.0)	
Urine culture					
Negative	n (%)	5 (71.4)	20 (71.4)	25 (71.4)	1
Positive	n (%)	2 (28.6)	8 (28.6)	10 (28.6)	
Injury site culture					
Negative	n (%)	5 (71.4)	25 (89.3)	30 (85.7)	0.256
Positive	n (%)	2 (28.6)	3 (10.7)	5 (14.3)	

Mann-Whitney U test (Monte Carlo), independent samples t-test, Pearson's chi-squared test (Exact/Monte Carlo), Fisher-Freeman-Halton test (Monte Carlo), Fisher Exact test (Exact), odds ratio (95% confidence interval). Min: Minimum, Max: maximum, SD: standard deviation, ARF: Acute renal failure, NLR: Neutrophil/lymphocyte ratio DIC: days in intensive care, SOFA: Sequential Organ Failure Assessment

developed sepsis as a result of other community-acquired factors. Two of those patients were initially diagnosed with H1N1, and oseltamivir treatment was begun; the diagnosis was later confirmed. *S. pneumoniae* was detected in three of the remaining patients, *H. influenzae* in one, and *S. aureus* and aspergilloma in the last one.

It has been reported that ICU admission rates are high in migrant populations because such factors as a lack of prevention and protection in healthcare services, the withdrawal of vaccination programs, low environmental hygiene standards, outdoor living conditions, overcrowding, and exposure to low temperatures have raised the sensitivity to infection (28-33).

Regarding the limitations of our study, it was not possible to evaluate the ICU hospitalization among the local population in the same period, and the number of cases was low. However, its most important advantage is the fact that it is the first study evaluating sepsis among the Syrian patients in an ICU in our country; as such, it can shed light on wider studies to be conducted.

Conclusion

Syrian patients were admitted to the ICU mostly due to respiratory system disease. Comorbid disease was the most common heart disease. *A. baumanii* and *E. coli* were

Table 6. Diagnostic classification of sepsis patients	
Diagnosis	**n=35 (%)**
Gunshot wound	7 (20.0)
Respiratory diseases	10 (28.6)
Renal diseases	2 (5.7)
Trauma	5 (14.3)
Cardiac diseases	5 (14.3)
Cancer	3 (8.6)
Intoxication	1 (2.9)
Gastrointestinal disease	1 (2.9)
Other	1 (2.9)

Table 7. Classification of antibiotics used		
Antibiotic	**All patients n (%) (X*)**	**Sepsis patients n (%) (X*)**
None used	13 (5.7)	-
β-lactam/β-lactamase inhibitor	65 (28.6)	12 (13.8)
2nd, 3rd, & 4th generation cephalosporins	43 (18.9)	2 (2.3)
Carbapenems	27 (11.9)	17 (19.5)
Colistin	15 (6.6)	16 (18.4)
Tigecycline	12 (5.3)	11 (12.6)
Quinolones	11 (4.8)	3 (3.4)
Anti-anaerobic agents	8 (3.5)	3 (3.4)
Linezolid	8 (3.5)	4 (4.6)
Macrolides	7 (3.1)	3 (3.4)
Antifungals	7 (3.1)	7 (8.0)
Sulfonamides	4 (1.8)	4 (4.6)
Oseltamivir	3 (1.3)	2 (2.3)
Aminoglycosides	2 (0.9)	1 (1.1)
Glycopeptides	2 (0.9)	2 (2.3)
X*: One patient used more than one		

isolated most frequently in Syrian patients and 2nd, 3rd, & 4th generation cephalosporins were used most frequently in septic patients, and carbapenems also were used in these patients. APACHE-II scores, the duration of MV, and the number of days hospitalized in ICU were all found to be higher for deceased patients than for the survivors.

Ethics

Ethics Committee Approval: Approval for the study (decision no: 04, date: 05.04.2017) was obtained from Kahramanmaraş Sütçü İmam University's Ethics Committee.

Informed Consent: Patient information was analyzed retrospectively from the records and patient files in the hospital's information management system.

Peer-review: Externally peer-reviewed.

Authorship Contributions

Surgical and Medical Practices: Ş.P.T., H.T.G., S.Ç., Concept: Y.O., Ş.P.T., H.T.G., S.Ç., F.O., F.M.Y., Ö.F.B., A.D., Design: Y.O., Ş.P.T., S.Ç., F.O., F.M.Y., Ö.F.B., Data Collection and Process: Y.O., Ş.P.T., H.T.G., S.Ç., F.O., A.D., Analysis or Interpretation: Y.O., H.T.G., F.O., F.M.Y., Ö.F.B., A.D., Literature Search: Y.O., F.O., F.M.Y., Ö.F.B., A.D., Writing: Y.O., F.O., F.M.Y., Ö.F.B., A.D.

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The authors declared that this study received no financial support.

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