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Original Article

# Can 4C Score Predict Mortality due to COVID-19 Pneumonia in Syria? An Observational Study

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## ABSTRACT

**Objective:** The aim of this study was to investigate the patients treated for COVID-19 in pandemic hospitals in northwestern Syria.

**Methods:** The study evaluated all patients hospitalized for COVID-19 by the pandemic emergency departments of hospitals in northwestern Syria between July 1, 2020, and December 1, 2020. The demographic, clinical, laboratory, and imaging characteristics, 4C mortality index score treatments, and progressions of all patients hospitalized for COVID-19 were retrospectively reviewed.

**Results:** A total of 991 patients admitted to hospitals in northwestern Syria by pandemic emergency services for treatment and follow-up were included. The study included 114 patients from Afrin Hospital, 527 from Azez Vatan Hospital, 99 from Jarabulus Hospital, and 251 from Al-Bab Hospital. When comparing the mortality and hospitalization rates of the patients according to the 4C mortality score, it was found that the patients with a high-risk score in Azez Vatan and Jarabulus Hospitals and those with very high-risk score in Al-Bab Hospital had significantly higher mortality and hospitalization rates in the ICU ($p<0.05$).

**Conclusion:** The data obtained from studies evaluating the approach to the COVID-19 epidemic in this and similar regions are important for developing health services in disadvantaged regions. We believe our study will make an important contribution to the literature, as it is the first and only data reflecting hospitalized patients with COVID-19 in this region.

## INTRODUCTION

While it was shown that the most developed countries in the world had difficulties fighting the pandemic, countries that are underdeveloped and with underdeveloped health systems even had difficulties determining the damage. When it comes to underdeveloped countries and areas with poor health systems, Syria in the Middle East is identified as one of the countries where there is internal unrest. Due to the internal unrest that has been going on for about 10 years, half of the Syrian population has been displaced by internal and external migration, and the country has become a vulnerable region to the pandemic due to the loss of health system integrity.[1,2]

Different health systems are used in different regions of Syria. In northwestern Syria, where about 4.17 million people live, hospital services can be provided as part of humanitarian assistance. In this context, the people are provided with the hospitals opened by Turkey as cardinal. In addition, in coordination with Turkey and the WHO, actions and measures have been taken to provide health consultancy and services within the framework of humanitarian assistance in the region's fight against COVID-19. Among the hospitals opened by Turkey, strategically located hospitals were converted into pandemic hospitals. In our study, we aimed to evaluate the patients hospitalized due to COVID-19 in pandemic hospitals in northwestern Syria. Thus, in this study, first of all, the situation of patients receiving health services within the scope of humanitarian aid in the event of an epidemic such as COVID-19 in northwestern Syria, as a sample region after internal conflicts, was evaluated. Second, the validity of the 4C mortality index used in developed countries in northwestern Syria was evaluated.

## MATERIALS AND METHODS

### Study design

This study was carried out in four hospitals mentored

by Turkey (Afrin Hospital, Azez Vatan Hospital, Jarabulus Hospital, and Al-Bab Hospital) in northwestern Syria between July 1, 2020, and December 1, 2020. The file records of a total of 991 patients admitted to these hospitals due to COVID-19 and hospitalized were reviewed retrospectively. Before starting the study, permission was obtained from the Ministry of Health of the Republic of Turkey (Date: 29/11/2020 and Decision no: 2020-11-20T13_05_30), Hatay Mustafa Kemal University Non-Interventional Research Ethics Committee (Meeting number: 03.12.2020 and Decision number: 02), and the relevant hospital administrations. In addition, the study was carried out in accordance with the "World Medical Association Declaration of Helsinki Ethical Principles."

## Place of study

In northern Syria, Turkey has opened hospitals for humanitarian aid, providing consultancy services. Syrian doctors, nurses, and other health workers work in these hospitals and serve the local people in northern Syria. The study was conducted in Afrin, Azez Vatan, Jarabulus, and Al-Bab Hospitals. The geography and population served by these hospitals are unique.

Afrin Hospital: Afrin is a place with a cosmopolitan population in the neighborhood of Idlib, Aleppo, Azez, and Turkey, which has received intense immigration from Syria, whose population is approaching 600 thousand. They have agriculture, industry, and commerce business lives. Regular and irregular camps affect the population density. It is one of the most populated cities in northwestern Syria along with Idlib. Although Afrin Hospital looks like it was designed as a trauma hospital, it was restored and opened to public service with 100 beds after the region was cleared of terrorism.[3] Routine laboratory tests can be done in the hospital. computed tomography (CT), X-ray, and ultrasonography (USG) facilities are available. There is no PCR laboratory in the hospital. PCR tests are either forwarded to Turkey or other regional hospitals.

Azez Vatan Hospital: Azez is 42 km south of Kilis, the border province of Turkey. It has a population of approximately 300 thousand, where tent cities and city life are located.[4,5] There is a working life mainly in commerce and industry. Azez Vatan Hospital is a hospital in the west of Azez city with a capacity of 186 beds. Besides the general intensive care units, there is also a special intensive care unit for COVID-19.[6] There is no PCR laboratory and CT device in the hospital. PCR tests are sent to Turkey and studied in other hospitals. The hospital, which was established at the beginning of 2020, does not have a CT device, and therefore the patients are evaluated with X-ray, and their treatment processes are carried out.

Jarabulus Hospital: The hospital, which started to serve in 2016, is located in the city center of Jarabulus, which is adjacent to the Gaziantep Karkamış border district. The city of Jarabulus is just west of the Euphrates, close to the Turkish border. The city does not have easy access to reach other cities in the west because the city does not have a transportation connection with the city centers in the east and south. The people of the region, who live on agriculture and animal husbandry, have limited contact with other cities and have a partially isolated population.[7] There is a CT device and a PCR laboratory in the 75-bed hospital. Additional treatment building provides services for COVID-19 patients. Routine laboratory tests can be done. X-ray and USG facilities are available.

Al-Bab Hospital: The city of Al-Bab has about 400 thousand population. This place is in the south of the cities of Jarabulus, Çobanbey, and Mare, where there are business lines in the fields of trade and industry.[8] Al-Bab Hospital has 200 beds. There is no PCR laboratory. There is a CT device and a separate isolated intensive care unit for COVID-19. Routine laboratory tests can be done. X-ray and USG facilities are available.[9–11]

## Selection of participants

Patients over the age of 18 years who applied to the emergency department with the suspicion of COVID-19 and were hospitalized were included in the study. Patients under the age of 18 years, who were registered repeatedly, and whose data could not be accessed were excluded from the study. Patients were investigated for inflammatory markers and 4C mortality index.

## Obtaining the data

Demographic data, hospital information, comorbid conditions, vital signs, laboratory analysis results, PCR test results, imaging results, treatments applied, length of stay, and 4C mortality indexes of the patients were recorded in the preprepared data record form.

## Statistics

Statistical analyses of the study were performed using the Statistical Package for Social Sciences for windows software (IBM SPSS version 25.0, Armonk, NY, USA). The normality assumption of continuous variables was tested using the Kolmogorov–Smirnov and the Shapiro–Wilk tests. According to the normality assumption, the descriptive statistics of the variables are reported as mean ± standard deviation, median ($25^{th}$–$75^{th}$ percentiles), and frequencies n (%). Chi-squared tests and Kruskal–Wallis tests were used for univariate analyses of variables in the study, depending on the type of variable and availability of assumptions. Pairwise comparisons of groups with significant differences between them as a result of the Kruskal–Wallis test were performed with the Mann–Whitney U test and analyzed using the Bonferroni correction (0.05 per group number).

# RESULTS

A total of 991 patients were included, 114 from Afrin Hospital, 251 from Al-Bab Hospital, 527 from Azez Vatan Hospital, and 99 from Jarabulus Hospital, where COVID-19 patients were hospitalized by the pandemic emergency in

**Table 1.** Distribution of age and gender of patients by hospitals

| | | Total | Afrin | Azez Vatan | Jarabulus | Al-Bab |
|---|---|---|---|---|---|---|
| Age (average) | | 58.02±18.32 | 62.38±17.26 | 54.99±20.45 | 60.09±16.16 | 60.40±15.39 |
| Sex, n (%) | Male | 598 (60.3) | 164 (65.3) | 76 (66.7) | 60 (60.6) | 298 (56.5) |
| | Female | 393 (39.6) | 87 (34.7) | 38 (33.3) | 39 (39.4) | 229 (43.5) |

**Table 2.** Comparison of age, gender, and length of stay of patients according to hospitals

| | Total | Afrin (n=114) | Azez Vatan (n=527) | Jarabulus (n=99) | Al-Bab (n=251) | p |
|---|---|---|---|---|---|---|
| Median age ($25^{th}$–$75^{th}$) | 60 (47–70) | 66 (53.0–74.0)[a] | 58 (40.0–70.0)[b] | 65 (48.0–70.0)[a] | 60 (53.0–72.0)[a] | 0.000* |
| Sex, n (%) | | | | | | |
| Male | | 76 (66.7) | 298 (56.5) | 60 (60.6) | 164 (65.3) | 0.049 |
| Female | | 38 (33.3) | 229 (43.5) | 39 (39.4) | 87 (34.7) | |
| Days of stay ($25^{th}$–$75^{th}$) | 3 (1–6) | 4 (2–7)[b] | 2 (1–5)[a] | 2 (1–4)[a] | 5 (3–6.25)[b] | 0.000* |

*The difference between the means indicated with the same letter in the same line is not statistically significant (p>0.05).

northwestern Syria were treated and followed up. The average age of the patients was 57.7 years. Table 1 shows the age and gender distribution of patients. When comparing patients' age, gender, and length of stay by hospital, Azez Vatan had the lowest mean age (p=0.000), the highest hospitalization rate for males was found in Afrin, and the highest hospitalization rate for females was found in Azez Vatan (p=0.049). The length of stay of patients in Jarabulus Hospital was significantly longer (p=0.000) (Table 2).

Of the patients enrolled in the study, 444 (44.8%) were smokers. Smoking rates were 74.7% in Jarabulus (n=74), 45.5% in Azez Vatan (n=240), 32.3% in Al-Bab (n=81), and 43.0% in Afrin Hospital (n=49). The smoking data of 79 patients could not be obtained.

It was found that most patients lived in Azez, Al-Bab, and Afrin (Fig. 1). The distribution of comorbid conditions is shown in Figure 2.

When the ICU hospitalization rate was examined, it was highest in Jarabulus (n=34, 34.3%) and lowest in Al-Bab Hospital (n=41, 16.3%). In addition, the average saturation on admission was 87.34±18.74 in Jarabulus Hospital, whereas the highest average saturation on admission was 89.08±9.75 in Azez Vatan Hospital. Considering the laboratory values, the highest average WBC value (13.74±7.57) was found in the patients in Afrin Hospital, while the additional higher average CRP value (231.71±135.82) was found in the patients in Jarabulus Hospital (Table 3). Table 3 shows the distribution of the descriptive data of the patients according to the hospitals.

Examining the distribution of patients according to the 4C mortality index, we find that the highest prevalence is concentrated in points 3 (14.74%) and 4 (11.38%). However, the mortality rate of patients with very high-risk scores was 63.8% (Fig. 3).

When comparing the mortality and hospitalization rates of the patients according to the 4C scoring system, it was found that the patients with high-risk scores in Azez Vatan and Jarabulus Hospitals and the patients with very high-risk

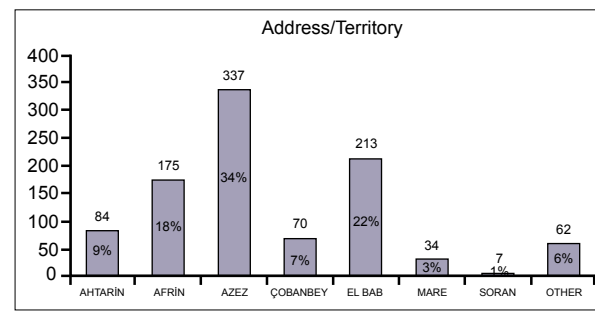


**Figure 1.** Distribution of patients by addresses.

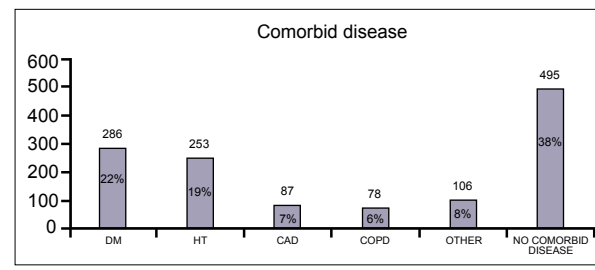


**Figure 2.** Patients' comobedities.

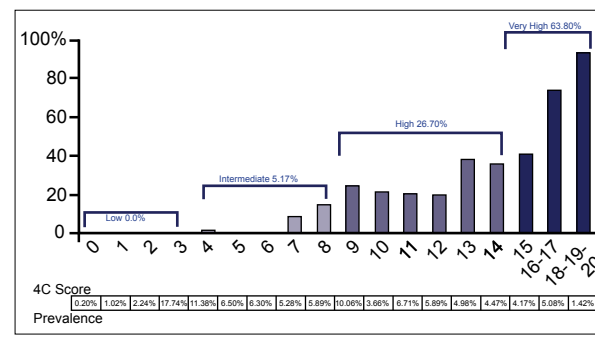


**Figure 3.** Distribution of the patients according to the 4C mortality index.

**Table 3.** Hospital services, vitals, laboratory findings, PCR results, imaging results, and treatments

| | Total | Afrin | Azez Vatan | Jarabulus | Al-Bab |
|---|---|---|---|---|---|
| Service n(%) | | | | | |
| Ward | 742 (74.9) | 87 (76.3) | 380 (72.1) | 65 (65.7) | 210 (83.7) |
| Intensive care unit | 237 (23.9) | 27 (23.7) | 135 (25.6) | 34 (34.3) | 41 (16.3) |
| Isolation | 12 (1.2) | 0 | 12 (2.3) | 0 | 0 |
| Vitals | | | | | |
| $SpO_2$ on admission (pulse oximetry) | 88.75±9.61 | 86.69±11.91 | 89.08±9.75 | 85.68±8.26 | 87.87±21.83 |
| Body temperature on admission (°C) | 36.83±0.62 | 37.01±0.57 | 36.71±0.56 | 36.92±0.58 | 36.91±0.70 |
| Pulse on admission ($min^{-1}$) | 90.44±16.33 | 89.30±15.71 | 91.66±16.02 | 87.34±18.74 | 89.76±16.0 |
| Laboratory values | | | | | |
| WBC ($\times 10^6$ $L^{-1}$) | 10.96±5.88 | 13.74±7.57 | 9.98±7.89 | 6.90±3.0 | 12.28±5.64 |
| Neutrophil/Lymphocyte (rate) | 1.21±6.12 | 7.09±3.61 | 5.46±1.82 | 0.88±0.41 | 2.03±0.30 |
| RDW (%) | 18.92±9.62 | 14.37±1.59 | 18.67±2.98 | 13.29±1.30 | 14.20±3.14 |
| Hemoglobin (g/dL) | 12.73±4.60 | 12.19±1.88 | 13.17±2.38 | 11.83±2.0 | 12.69±2.28 |
| Platelet ($\times 10^6$ $L^{-1}$) | 255.44±88.49 | 266.37±63.0 | 253.80±111.95 | 172.52±13.5 | 318.09±33.2 |
| Urea (mg/dL) | 63.13±58.31 | 64.86±24.86 | 28.04±11.06 | 56.51±14.5 | 75.49±22.90 |
| Crea (mg/dL) | 5.59±16.91 | 1.47±1.0 | 1.29±1.0 | 1.23±1.08 | 1.77±1.2 |
| Na (mmol/L) | 138.23±62.27 | 140.94±8.85 | 136.15±8.08 | 142.93±9.24 | 130.04±7.41 |
| KCl (mmol/L) | 3.83±1.20 | 4.78±0.72 | 4.8±1.7 | 3.6±0.8 | 4.12±1.21 |
| pH | 7.28±0.13 | 7.42±0.02 | 7.26±0.36 | 7.36±0.14 | 7.14±0.89 |
| $PCO_2$ (mmHg) | 41.80±13.38 | 46.0±15.83 | 44.96±20.74 | 36.63±9.86 | 43.68±7.51 |
| ALT (U/L) | 49.76±178.22 | 30.08±15.73 | 32.88±10.84 | 110.79±30.1 | 40.08±12.96 |
| AST (U/L) | 67.10±247.90 | 40.28±27.45 | 36.87±31.42 | 159.03±56.9 | 52.74±36.39 |
| CRP (mg/L) | 173.65±672.04 | 112.17±107.65 | 94.26±81.66 | 231.71±135.82 | 64.71±42.95 |
| Glucose (mg/dL) | 191.69±116.49 | 185.23±16.01 | 174.52±55.14 | 173.11±67.39 | 209.78±118.71 |
| PCR n (%) | | | | | |
| Positive | 392 (39.56) | 85 (74.6) | 130 (24.7) | 70 (70.7) | 107 (42.6) |
| Negative | 557 (56.21) | 18 (15.8) | 379 (71.9) | 29 (29.3) | 131 (52.2) |
| Missing | 42 (4.24) | 11 (9.6) | 18 (3.4) | | 13 (5.2) |
| CT/X-ray involvement n (%) | | | | | |
| Yes | 644 (64.98) | 28 (24.6) | 388 (73.6) | 35 (35.4) | 193 (76.9) |
| No | 198 (19.98) | 0 (0.0) | 94 (17.8) | 64 (64.6) | 40 (15.9) |
| Missing | 149 (15.04) | 86 (75.4) | 45 (8.5) | | 18 (7.2) |
| Taking medication? n (%) | | | | | |
| Yes | 647 (65.29) | 103 (90.4) | 231 (43.8) | 99 (100.0) | 214 (85.3) |
| No | 335 (33.80) | 10 (8.8) | 288 (54.6) | 0 (0.0) | 37 (14.7) |
| Missing | 9 (0.91) | 1 (0.9) | 8 (1.6) | | |
| Pulse steroid treatment n (%) | | | | | |
| Yes | 91 (9.18) | 62 (54.4) | 19 (3.6) | 0 (0.0) | 10 (4.0) |
| No | 891 (89.91) | 51 (44.7) | 500 (94.7) | 99 (100.0) | 241 (96.0) |
| Missing | 9 (0.91) | 1 (0.9) | 8 (1.7) | | |
| Has Favipiravir taken? n (%) | | | | | |
| Yes | 430 (43.39) | 80 (70.2) | 191 (36.2) | 99 (100.0) | 60 (23.9) |
| No | 552 (55.70) | 33 (28.9) | 328 (62.1) | 0 (0.0) | 191 (76.1) |
| Missing | 9 (0.91) | 1 (0.9) | 8 (1.7) | | |

scores in Al-Bab Hospital had significantly higher mortality and ICU admission rates ($p<0.05$). In contrast, in Afrin Hospital, patients with moderate risk scores had a significantly lower ICU admission rate ($p=0.016$) (Tables 4 and 5).

It was found that ICU admission rates were significantly higher in Afrin (96.4%) and Jarabulus (77.1%), and admission rates were significantly higher in Al-Bab (81.3%) and Azez Vatan (73.5%) in patients with positive imaging ($p<0.05$).

## DISCUSSION

Northwestern Syria is not under the central government's control, and people in the region have difficulty accessing

**Table 4.** 4C mortality indexes of hospitals' dead COVID-19 patients

| | | Total | Afrin | Azez Vatan | Jarabulus | Al-Bab |
|---|---|---|---|---|---|---|
| | | n (%) | n (%) | n (%) | n (%) | n (%) |
| 1 | Low | 1 (0.56) | – | 1 (1.5) | – | – |
| 2 | Moderate | 19 (10.73) | 4 (16.0) | 7 (10.6) | 4 (13.8) | 4 (7.0) |
| 3 | High | 78 (44.07) | 11 (44.0) | 40 (60.6) | 17 (58.6) | 10 (17.5) |
| 4 | Very high | 79 (44.63) | 10 (40.0) | 18 (27.3) | 8 (27.6) | 43 (75.4) |
| | p | 0.000 | 0.179 | 0.000 | 0.010 | 0.000 |

**Table 5.** Relationship between patients' 4C mortality indexes and intensive care unit stay

| | | Total | Afrin | Azez Vatan | Jarabulus | Al-Bab |
|---|---|---|---|---|---|---|
| | | n (%) | n (%) | n (%) | n (%) | n (%) |
| 1 | Low | 20 (8.4) | – | 18 (13.3) | – | 2 (4.9) |
| 2 | Moderate | 54 (22.8) | 2 (7.4) | 46 (34.1) | 5 (14.7) | 1 (2.4) |
| 3 | High | 103 (43.5) | 13 (48.1) | 64 (47.4) | 20 (58.8) | 6 (14.6) |
| 4 | Very high | 60 (25.3) | 12 (44.4) | 7 (5.2) | 9 (26.5) | 32 (78.0) |
| | p | 0.000 | 0.016 | 0.000 | 0.005 | 0.000 |

nationally or internationally recognized health services. Health services in the region are provided as part of humanitarian assistance. Many international nongovernmental organizations are trying to support health services under the supervision and coordination of Turkey and WHO. In addition, there are academic project studies on data collection to improve health services in the region.[12] While there is no comprehensive publication in the literature based on data specific to the region, articles can be written on predictions. As an example, the COVID-19 related forecast for northwestern Syria in May 2020 discusses two scenarios. If it is assumed that 4 per thousand of the total population is infected, the total number of patients is estimated to be 16 000, and it is predicted that 2500 of these patients will be severely ill and 819 will be seriously ill. Assuming that 4.4% of the population is infected in the second scenario, the total number of patients is estimated at 185 thousand, of which 27 805 patients will be severely ill and 9268 patients will be seriously ill. Considering the camps, it was calculated that about 2500 care beds and 240 intensive care beds should be available in the region.[13] The hospitals opened and operated by Turkey in the framework of humanitarian aid were considered in our study. There is no other health facility in the region that accepts pandemic patients. Therefore, all patients who required hospitalization in the region were treated in these hospitals. A total of 991 patients were hospitalized, and 237 of these patients were followed up in the intensive care unit. The fact that the Idlib region was not included in our study may have led to lower results than the estimates in the scenarios of Hariri et al. In addition, the social protection measures taken by the local councils and the restrictions on customs clearance may have contributed to the decrease in the number of patients.

Based on a review of the literature, the average age of hospitalized patients is 69.4 years in Spain, 64 years in England, 63 years in New York, and 61 years in Northern California.[14–17] Looking at developing countries, it is noticeable that hospitalized patients in Brazil are over 60 years old, while the average age in the northeast of Ireland was 60.6 years and, in a study conducted in Iran, it was 57.33 years.[18–20] In a study of immigrants in Spain, the mean age of hospitalized patients was 47 years; in a study conducted in Kuwait, the mean age of Kuwaitis was 44.3 years and that of non-Kuwaitis was 41.0 years; and in a study conducted in India, the mean age was 40 years.[21,23] In our study, the average age of hospitalized patients in Afrin, Al-Bab, and Jarabulus was 60 years and above, similar to the literature, while in Azez Vatan, it was 55 years. The overall average of patients included in the study was 57.7 years.

Considering the sex ratio of patients hospitalized for COVID-19 in the literature, the rate of male patients in the USA, France, Spain, and India varied between 57% and 60%,[10,14,24,25] while in Kuwait and Turkey, this rate was between 51% and 52%.[21,22] In our study, this rate was approximately 60%. The data in our study are predominantly males, which is consistent with the literature. Since male patients are at higher risk for COVID-19 and are more likely to have access to hospitals, it can be assumed that male patients are more likely to be hospitalized. However, the higher rate of female patients in Azez Vatan compared with other hospitals in our study can be explained by the fact that women are more likely to get sick because Azez is a busier and more social city, and women can also access the hospital more easily.

Critical patients are followed up in the intensive care unit. In the literature, hospitalization rates of patients in inten-

sive care units are 26%–28% in China and the USA,[14,16] 16%–17% in India, England, and Iran,[15,18,23] 10%–15% in Spain and Turkey.[15,22] In our study, this rate ranged from 16% to 34% and averaged at 23.8%, similar to China and the USA.

In our study, one out of two patients was diagnosed with a comorbid disease. In the literature, 68.5% of patients hospitalized in Kuwait were found to have no comorbidity, whereas in a study conducted in India, comorbidity was found in 62.5% of patients hospitalized in the ICU and 37.5% of patients hospitalized in the ward.[21,23] The differences between studies could be due to geographic and social differences.

Meta-analyses from the USA and China found that hospitalization rates were lower among chronic smokers.[26–28] Similar results were found in a study conducted in Iran.[29] In our study, in accordance with the literature, it was observed that most of our hospitalized patients did not smoke.

In the study of saturation value of hospitalized patients due to COVID-19, the average saturation value were 95 in the study by Richardson et al.[17] and 94 in the study by Casas-Rojo et al.[15] In our study, the average saturation values were 86 in Afrin, 87 in Al-Bab, 89 in Azez Vatan, and 85 in Jarabulus. While these hospitals served as pandemic hospitals, they had to continue their services in other areas at the same time. The reason our saturation data are lower than those in the literature may be due to the limited bed capacity of hospitals in the region for COVID-19 and the need to admit more critical patients.

In a study conducted in Turkey, CT findings of COVID-19 were found in all patients in the ICU and 64.1% of patients in the ward.[22] In hospitalized patients in Northern California, COVID-19 was found on the first radiograph on admission in 79.2% of patients in the ward and in 93.8% of patients in the ICU.[24] In a multicenter study, radiographic involvement rates on the first admission were found to range from 59% to 75% in China. In Spain, this rate was 86.8%.[14] In Azez Vatan Hospital, where most of the patients in our study were observed, there is no CT machine. Radiographs are used as an imaging modality in the evaluation of patients. In general, the rate of patients with imaging findings in Al-Bab and Azez Vatan Hospitals is over 70% when evaluating CT or radiographs, while this rate is half or less in Afrin and Jarabulus Hospitals. For patients with positive imaging findings, the rate of hospitalization in Al-Bab and Azez Vatan Hospitals is over 70%, while this rate in Jarabulus and Afrin Hospitals is strikingly different at 77% and 96%, respectively, in favor of intensive care. The difference in admissions of patients may have led to this conclusion, as hospitals in Al-Bab and Azez Vatan have twice as much bed capacity as hospitals in Afrin and Jarabulus. It is possible that more critically ill patients were admitted to a smaller number of beds.

Publications in the literature also show that PCR tests can be negative. Patients suspected by imaging studies are isolated, and the situation is reevaluated with PCR testing.[30] In our study, PCR results were negative in more than half of the patients. PCR tests in the region are sent to Turkey and provide a result within one to two days. In this case, patients are evaluated according to the clinic, and decisions about treatment and hospitalization are made. Clinical foresight and suspicion still seem to be important in disadvantaged zones and epidemic situations.

When the hospitalization duration of COVID-19 patients was studied, it was found that the hospitalization duration in the USA ranged from 4.5 to 6 days, while the follow-up time in the intensive care unit averaged 15 days.[16] In Turkey, the average length of stay in the ward was 9 days, the average follow-up time in the ICU was 18 days, and the average length of stay in the general hospital in Iran was 9.35 days.[19,22] In contrast, it was reported that patients in India spent an average of 12.8 days in the ward and 4.3 days in the ICU.[22] Compared with the literature, it was found that the length of hospital stay of patients in our study was shorter. The reason could be the high patient circulation.

In our study, patients were administered a pulse steroid in 9.17% of cases. Also, when evaluating the pulse steroid intake rate of patients hospitalized in California, 7.6% of patients in the ward and 12.4% of patients in the ICU received pulse steroids, and the overall average was 9%.[24]

Considering the 4C mortality index of the patients included in the study, we found that the mortality rates were close to the literature.[31] According to the results of our study, it is reasonable to assume that the use of the 4C mortality index could be beneficial in patients hospitalized in the region.

## CONCLUSION

The population in northwestern Syria is able to access health services thanks to humanitarian assistance. The main hospitals in the region are those opened and consulted by Turkey, and they are the pandemic hospitals in the region. The protocol for handling hospitalized patients with COVID-19 in the region was established based on the hospitals in Turkey. Diagnosis, examination, treatment, and follow-up of patients were performed accordingly. The data that can be obtained from studies evaluating the management of the COVID-19 epidemic in this and similar regions are important for the development of health services in disadvantaged regions. We believe our study will make an important contribution to the literature because it represents the first and only data on hospitalized patients with COVID-19 in this region.

In the study, in which four different regions victimized due to internal disturbances were examined, a correlation was found between positive radiological findings and mortality. In addition, high scores in the 4C mortality index were associated with death and hospitalization in the intensive care unit. Using the 4C mortality scoring system and the detection of those with positive radiological findings may

contribute to the detection of risky patients and the prevention of pandemic-related deaths.

### Ethics Committee Approval

This study approved by the HMKÜ Faculty of Medicine Non-interventional Clinical Research Ethics Committee (Date: 03.12.2020, Decision No: 02).

### Informed Consent

Retrospective study.

### Peer-review

Internally peer-reviewed.

### Authorship Contributions

Concept: B.K., B.Ç.; Design: B.K., B.Ç.; Supervision: B.K., B.Ç.; Fundings: B.K., B.Ç.; Materials: B.K., B.Ç.; Data: B.K., B.Ç.; Analysis: B.K., B.Ç.; Literature search: B.K., B.Ç.; Writing: B.K., B.Ç.; Critical revision: B.K., B.Ç.

### Conflict of Interest

None declared.

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## Suriye'nin Kuzeybatısında Pandemi Acilden Yatırılan COVID-19 Hastalarının Değerlendirilmesi

**Amaç:** Bu çalışmada Suriye'nin kuzeybatısındaki pandemi hastanelerine COVID-19 nedeniyle yatan hastaların değerlendirilmesi amaçlandı.

**Gereç ve Yöntem:** Çalışmada 1 Temmuz 2020–01 Aralık 2020 tarihleri arasında Suriye'nin kuzeybatısındaki Pandemi hastanelerine COVID-19 nedeniyle pandemi acilden yatan tüm hastalar değerlendirilmiştir. COVID-19 nedeniyle yatan tüm hastalar için demografik, klinik, laboratuvar, görüntüleme özellikleri, 4C mortalite indeksi skorları ile tedavileri ve progresyonları retrospektif olarak araştırıldı.

**Bulgular:** Çalışmaya Suriye'nin kuzeybatısında pandemi acilden yatan COVID-19 hastalarının tedavi ve takiplerinin yapıldığı Afrin Hastanesi'nden 114, El-Bab Hastanesi'nden 251, Azez Vatan Hastanesi'nden 527, Cerablus Hastanesi'nden 99 olmak üzere toplam 991 hasta dahil edildi. 4C mortalite skorlama sistemine göre hastaların ölüm ve yoğun bakıma yatış oranları karşılaştırıldığında Azez Vatan ve Cerablus Hastaneleri'nde yüksek risk skoru alanların, El Bab Hastanesi'nde ise çok yüksek risk skoru alanların ölüm ve yoğun bakım yatış oranları anlamlı olarak daha yüksek bulunmuştur ($p<0.05$).

**Sonuç:** Bu ve benzeri bölgelerde COVID-19 salgınına yaklaşımın değerlendirildiği çalışmalarla elde edilecek veriler mahrumiyet bölgelerinde sağlık hizmetinin geliştirilmesinde önem arz etmektedir. Bölgede COVID-19 nedenli yatan hastaları yansıtan verilerimizin ilk ve tek olması nedeniyle çalışmamızın literatüre önemli bir katkı sağlayacağını düşünmekteyiz.

**Anahtar Sözcükler:** 4C Mortalite Skoru; acil servis; COVID-19; Suriye.