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After COVID-19 Infection Extended Intensive Care Process and Assessment of its Cost

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What is known on this subject?

Prolonged intensive care unit stays get more costs to the hospitals.

What this study adds?

Complicated coronavirus disease-2019 cases prevent the effective use of intensive care units. Additionally, these cases cause cost increases.

ABSTRACT

Objective: In coronavirus disease-2019 (COVID-19), the length of stay (LOS) in the intensive care unit (ICU) is about a month. In this case series, we assessed the reason for the long LOS in ICU and the cost analysis.

Material and Methods: The study was designed retrospectively. We investigated 533 patients and identified 9 patients with a hospital stay of more than 30 days.

Results: Generally, 9 patients were admitted to the ICU with clinical findings that were not specific for COVID-19. During the ICU follow-up, we observed that secondary infection and acute respiratory distress syndrome developed in all the patients. Simultaneously, we determined that the prolonged ICU stay caused additional costs.

Conclusion: In the terms of COVID-19 pandemic; the prolongation LOS in ICU leads to cost increase and negative affects the health system.

Keywords: ICU, prolonged LOS, COVID-19, cost

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Introduction

Coronavirus disease-2019 (COVID-19) is an infection with a high morbidity and mortality, requiring hospitalization and intensive care unit (ICU), at the same time creating a serious burden on the health budget. Generally, patients admitted to the ICU from the pandemic clinic or the emergency department to provide invasive or non-invasive mechanical ventilator support due to advanced respiratory failure. A major part of the patients leave the ICU within the first month. In this case series, we assessed the reason for the long hospitalization of patients with long-term ICU and the medical cost.

Material and Methods

During November 2020 and February 2021, we investigated 533 patients that we followed up in our unit due to COVID-19 and identified 9 patients with a hospitalization period of more than 30 days. An informed approval form was obtained from all patients. Approval was obtained from the Clinical Research Ethics Committee of the University of Health Sciences Turkey, Başakşehir Çam and Sakura City Hospital (no: 2022.01.36, subject number: KAEK/2022.01.36).

Age, gender, days of ICU stays and mortality of the patients were recorded. Also, complication that depend on prolonged in the ICU of the patients were recorded. Cost analysis was performed for each patient with prolonged hospitalization. Cost analysis was done with current hospital billing unit data The average cost was calculated. The statistical data were not used in case of the patient number was 9.

Results

Two of the patients were female and 7 were male and the age range ranged from 36 to 73 years (Table 1). The first thing that stood out in these patients was that they were admitted to the ICU clinical findings that did not support COVID-19. Among these patients who were hospitalized in the ICU for more than 30 days due to COVID-19, 3 patients had regression in Glasgow Coma scale, 2 patients had respiratory arrest, 1 patient had hepatic failure associated with acute respiratory distress syndrome (ARDS), 2 patients were admitted from the emergency department with an ischemic cerebrovascular disease (Table 2). One patient was taken over from the pandemic due to clinic respiratory failure. COVID-19 positivity was detected in polymerase chain reaction (PCR) tests. During the ICU follow-up, all patients developed secondary infection and ARDS, while deep vein thrombosis in 1 patient, pneumothorax in 1 patient, arrhythmia in 1 patient, neurological disorder in 2 patients, and acute renal failure in 1 patient. All 9 the patients were followed up on a mechanical ventilator with tracheostomy. Among these patients, the minimum number of ICU hospitalization days was 33, while the maximum was 395 days. While 3 patients who were followed up and treated in the ICU were transferred to the clinic, 6 patients died. In the calculation that made with the fees which were determined by the Republic of Turkisch Ministry of Health during the study period, we determined that the treatment expenses of these patients were 74060±10863.4 TL.

Table 1. Demographic characteristics

Age	55.88±11.83 (36-73)
Gender F/M	2/7
LOS in ICU	82.66±117.75 (33-395)
Mortality	66%

LOS: Lenght of stay, ICU: Intensive care unit, F: Female, M: Male

Table 2. Complications in patients with prolonged stay in ICU

Secondary infection and ARDS	9 patients
Neurological disorder	3 patients
Deep vein thrombosis	1 patient
Pneumothorax	1 patient
Arrhythmia	1 patient
Acute kidney disease	1 patient

ICU: Intensive care unit, ARDS: Acute respiratory distress syndrome

Discussion

Patients with COVID-19 usually admit to the hospital with symptoms of fever, weakness, and cough (1). In studies of the first period of the pandemic, the average hospital stay of these patients was 4-53 days in China, while it was reported as 4-21 days in other countries (2,3,4,5). The data in these studies are in the first period of the disease and in the following periods, studies with different results have been revealed with the updating of the information about the disease and the treatment practices.

With the rapid spread of COVID-19 in the world, clinicians tried determining the criteria for the effective and ethical use of hospital beds. Additionally, to the high mortality rate in patients with advanced age and co-morbidities, the length of hospital stay may be long (6). Especially, it has tried developing estimation models for ICU length of stay, but it is seen that the estimation models for the number of hospitalization days at the patient level are not very sufficient (7). Complex models with multiple parameters may also not be sufficient (8,9). In

addition to studies considering parameters such as age, Acute Physiology and Chronic Health Evaluation II, Simplified Acute Physiology II scores, there are also studies evaluating the clinical picture of ARDS and multiple organ failure (MOF). With these parameters, prolonged ICU length of stay estimations can be made (10,11,12). The length of stay in the ICU does not only depend on epidemiological and physiological parameters. ICU resources and access to treatment may also affect the length of stay (13).

This study, in which we evaluated our patients who were hospitalized in the ICU for more than 30 days, we saw that patients were transferred from other hospitals with diagnoses other than COVID-19 since our hospital is 4th level hospital. However, the PCR tests of all patients were positive. Simultaneously, we observed that the patiens had MOFs during the transfer. Therefore, we tought that the longer ICU stay in our patient group is because patients were admitted to the ICU with COVID-19 complications. Secondary infections and ARDS (2) were most frequent complications that had caused hospitalization due to COVID-19. Arrhythmia, shock, acute cardiac injury, acute kidney injury (1) was also developed. Similarly, ARDS and secondary infections were observed in our patients during their follow-up.

The cost of COVID-19 to the health system is another important dimension of this epidemic. It has been determined that a symptomatic COVID-19 case in the USA can lead to an average of $3,045 direct medical costs during its course (14). In our study, the prolonged hospitalization and the struggle with complications constitute the reason for this increase in costs. According to a cost-effectivity study conducted in COVID-19 patients in South Africa; according to the normal service hospitalization; it was observed that there was a difference of about 3 times (15). Another study from the USA, it was stated that the cost increased in parallel with the length of stay in the ICU and comorbidity (16).

Study Limitations

There are some limitations to our study. First, the study was retrospective. Secondly, the number of patients was small.

Conclusion

Although it is ideal to complete the treatment of the patient before complications that develop during the COVID-19 ICU, it is not always possible. The prolongation of the process also leads to negative cost analysis and affects the health system.

Ethics

Ethics Committee Approval: Approval was obtained from the Clinical Research Ethics Committee of the University of Health Sciences Turkey, Başakşehir Çam and Sakura City Hospital (no: 2022.01.36, subject number: KAEK/2022.01.36).

Informed Consent: An informed approval form was obtained from all patients.

Peer-review: Externally peer-reviewed.

Authorship Contributions

Surgical and Medical Practices: A.Ö., B.İ.F., M.Ü., Concept: A.Ö., Design: A.Ö., G.T., Data Collection or Processing: A.Ö., B.İ.F., M.Ü., Analysis or Interpretation: A.Ö., M.Ü., G.T., Literature Search: A.Ö., B.İ.F., Writing: A.Ö., G.T.

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