



Evaluation of Readmissions after Discharged from Intensive Care Unit in Patients with Coronavirus Disease-2019

Yoğun Bakım Ünitesinden Taburcu Edilen Koronavirüs Hastalığı-2019 Hastalarının Hastaneye Tekrar Başvurularının Değerlendirilmesi

Merve Sena BAYTAR¹ , Çağdaş BAYTAR² 

¹ Zonguldak Atatürk State Hospital, Department of Anesthesiology and Reanimation, Zonguldak, Turkey

² Zonguldak Bülent Ecevit University, Faculty of Medicine, Department of Anesthesiology and Reanimation, Zonguldak, Turkey

ORCID ID: Merve Sena Baytar 0000-0002-4829-4779, Çağdaş Baytar 0000-0001-7872-9676

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Corresponding Author

Merve Sena Baytar

E-mail

mervesena_88@hotmail.com

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ABSTRACT

Aim: The patients who survived and discharged from the intensive care unit (ICU) after coronavirus disease-2019 (COVID-19), has been readmitted to the hospital with a various spectrum of symptoms. Being able to determine the reasons and duration of readmission time can guide post-discharge care. In this study, we aimed to analyze the rate and reasons for readmissions to the hospital in the first 60 days of Covid-19 patients discharged from the ICU.

Material and Methods: Patients admitted to a tertiary care state hospital's ICU between March 2020-February 2021 were evaluated retrospectively. The discharge disposition, time to readmission and symptoms during readmission were recorded.

Results: A total of 145 patients were evaluated. While 89 (61%) of these patients died, 56 (39%) were discharged. It was observed that 38 of the discharged patients readmitted to the hospital, while 18 did not readmit. The mean time to first admission to the hospital was 21.34 days. The most common symptoms were dyspnea and malaise-fatigue. It was observed that patients who require mechanical ventilation during index hospitalization readmitted to the hospital with a higher rate.

Conclusion: Patients discharged from the ICU after COVID-19 have a high rate of readmission to the hospital in the first 60 days. It is important to determine the predictive factors for readmission and to identify patients who need close follow-up after discharge and for this more comprehensive studies are needed.

Keywords: COVID-19, Readmission, Readmission mortality, Readmission predictor

ÖZ

Amaç: Koronavirüs hastalığı-2019 (COVID-19) sonrası taburcu olan hastaların birçok şikayetle hastanelere başvurduğu görülmüştür. Başvuru nedenlerini ve süresi hakkında bilgi sahibi olmak taburculuk sonrası bakımı yönlendirebilir. Bu çalışmada yoğun bakım ünitesinden taburcu olan COVID-19 hastalarında ilk 60 gün hastaneye yeniden başvuru oranını ve nedenlerini analiz etmeyi amaçladık.

Gereç ve Yöntemler: Üçüncü basamak yoğun bakım ünitesinde Mart 2020-Şubat 2021 tarihleri arasında COVID-19 tanısı ile interne edilen olguların taburculuktan sonraki ilk 60 gün içinde aynı hastaneye yapılan başvuruları retrospektif olarak değerlendirildi. Taburculuk durumları, taburculuk sonrası ilk başvuru süresi, başvuru şikayetleri ve başvuru birimler kaydedildi.

Bulgular: Toplam 145 hasta değerlendirildi. Bu hastaların 89'u (%61) exitus olurken 56'sı (%39) taburcu edilmiştir. Taburcu olan hastaların 38'i taburculuk sonrası hastaneye başvururken, 18'inin hastaneye



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başvurmadığı görüldü. Hastaneye ilk başvuru süreleri ortalama 21.34 gündü. En sık başvuru şikayetleri dispne ve kırınglık-yorgunluktu. Yoğun bakımda takip edildikleri dönemde mekanik ventilatör ihtiyacı olan hastaların daha yüksek oranla hastaneye başvurdıkları görüldü.

Sonuç: COVID-19 sonrası YBÜ'den taburcu olan hastaların ilk 60 gün hastaneye yeniden başvuru oranı yüksektir. Yeniden başvuru için prediktif faktörlerin belirlenerek taburculuk sonrası yakın takip ihtiyacı olan hastaların belirlenmesi önemlidir. Bunun için daha geniş çalışmalara ihtiyaç duyulmaktadır.

Anahtar Sözcükler: COVID-19, Yeniden başvuru, Yeniden başvuruda mortalite, Yeniden başvuru prediktörleri

INTRODUCTION

Novel Coronavirus disease-2019 (COVID-19) first came up in China and spread out rapidly all around the world in 2019 (1). The increasing number of hospital admissions due to pandemics has put a lot of pressure on healthcare systems. Most of the patients admitted with the diagnosis of COVID-19 were hospitalized for a long time and had to face many complications due to viral infection during this period (2). Among those who survived and discharged from the intensive care unit (ICU), many readmitted to the hospital with a various spectrum of symptoms (3).

To define the characteristics of patients who deteriorate after discharge may improve better determination of discharge time and whom to monitor more cautiously after sending the patient home. Being able to determine which patient has the most risk to be readmitted to the hospital in the following weeks after the discharge, can help the clinician choose better timing for discharging decision and select patients who will have a need for close follow-ups (2,4).

In our study, we aimed to determine the rate and reasons for readmissions to the hospital in the first 60 days of COVID-19 patients discharged from the ICU.

MATERIAL and METHODS

After The Ethics Committee approval (2021/05-7), patients admitted to the Zonguldak Atatürk State Hospital's Anesthesiology and Reanimation ICU between March 2020-February 2021 were evaluated retrospectively. Patients with suspected or confirmed COVID-19 and older than 18 years of age were included to the study. Readmissions to the same hospital (emergency department and outpatient clinic) within 60 days after the discharge were evaluated.

The data of age, gender, length of ICU and hospital stay, APACHE II score, vasopressor and mechanical ventilation (invasive/non-invasive) requirement, medical treatment, presence of chronic diseases and whether they were patients under home care service were recorded. The discharge disposition, duration from discharge until readmission, symptoms during readmission and the admitted hospital unit were obtained and recorded. Patients with a readmission to the same hospital within 60 days after the discharge were grouped as Group Readmission (Group

Re) and patients without readmission were grouped as Group Non-Readmission (Group Non-Re).

Statistical Analysis

For all the statistical evaluation SPSS® 22 for Windows® (Statistical Package for the Social Sciences, Armonk, NY, USA) was used. In the descriptive statistics, quantitative data are expressed as mean \pm standard deviation (SD), and median, interquartile range. Qualitative data are expressed as percentages (%). Conformity to normal distribution was assessed using the Shapiro Wilk test. Student's T-test were used to analyze the data that had a normal distribution. For data not exhibiting normal distribution, the Mann Whitney U-test and, the chi-squared test were used; $p < 0.05$ was considered statistically significant.

RESULTS

145 patients admitted to the ICU between March 2020-February 2021 were included to the study. The mean age of these patients was 67.39 ± 13.60 years and the mean length of ICU stay was 10.73 ± 9.49 days. While 89 of these 145 patients (61%) died, and 56 of them (39%) were discharged. Among those who has been discharged, 38 patients readmitted to the same hospital (Group Re), 18 patients (Group Non-Re) did not readmit (Figure 1). Clinical features and demographic data are compared between the groups in Table 1.

Nine of 38 patients who readmitted were applied to the hospital without symptoms after 7-10 days (for control). 29 patients applied to the hospital 48 times in the first 60 days after discharge. The mean duration from discharge until

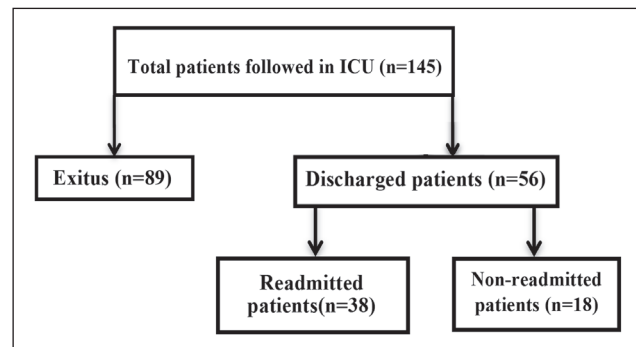


Figure 1: Trial follow diagram.

Table 1: Demographic and clinical data.

	Group Re (n=38)	Group Non-Re (n=18)	p
Age (years) [#]	68.42±10.99	65.22±18.11	0.496
Sex [#] (Male/Female)	20/18	10/8	0.838
Length of Stay in ICU [#] (day)	11.82±10.17	8.44±7.61	0.133
Length of Stay in Hospital [#] (day)	24.66±19.44	18.67±18.78	0.112
Apache II Score [#]	19.11±6.39	19.58±6.57	0.965
MV Requirement (+/-)	14/24	2/16	0.047*
Vasopressor Use (+/-)	5/33	0/18	0.164
Home Care Patient (+/-)	15/23	4/14	0.203
Renal Replacement Therapy (+/-)	3/35	11/7	1.000
Treatment			
Tosilizumab (+/-)	10/28	4/14	1.000
IVIG (+/-)	10/28	5/13	1.000
Corticosteroids (+/-)	10/28	8/10	0.175
Vitamin C (+/-)	17/21	9/9	0.712
Comorbidities (+/-)	15/23	7/11	0.967

Group Re: Readmitted patients, **Group Non-Re:** Non-readmitted patients, [#]: Mean±Standart Deviation, **IVIG:** Intravenous Immune Globulin, *: p=0.047, Chi-square test.

Table 2: Distribution of presenting symptoms by hospital units.

Presenting Symptoms	Readmission to Emergency (n=33)	Readmission to Outpatient Clinic (n=15)
Dyspnea	12 (37%)	1 (7%)
Fatigue-Malaise	9 (27%)	4 (27%)
Headache	3 (9%)	2 (13%)
Diarrhea	2 (6%)	2 (13%)
Chronic Disease Control	0	4 (27%)
Clouding of Consciousness	4 (12%)	0
High Blood Pressure	3 (9%)	0
Myalgia	0	2 (13%)

readmission was 21.34±14.52 days. The symptoms and hospital units during application were summarized in Table 2.

Among 33 patients who readmitted to Emergency Department (ED), one patient with severe dyspnea died, and one patient with clouding of consciousness was hospitalized to neurology clinic with cerebrovascular disease (CVD) diagnosis. This patient was re-discharged with recovery on the 12th day of the readmission. Another patient with dyspnea was hospitalized to the pulmonary medicine clinic with the diagnosis of pneumonia and discharged on the 3rd day. Five of the patients who readmitted to the ED were hospitalized in the ICU. Three of these patients were diagnosed with pneumonia and died respectively at 3rd,

12th, and 55th day after their readmission to the ICU. Two other patients who readmitted to the ED with clouding of consciousness diagnosed as CVD were re-discharged after 7th and 12th day respectively. All other ED readmissions were treated in outpatient and all readmissions to the outpatient clinic were not hospitalized. The rate of admission to the ICU was 13.15%, and the mortality rate was 10.5% of the patients who readmitted.

DISCUSSION

In our study, we retrospectively analyzed the readmissions of COVID-19 patients discharged from the ICU to the same hospital in the first 60 days. We determined that 67.8% of the discharged patients were readmitted to the hospital. 16% of discharged patients were admitted to the hospital without any symptoms with the aim of control and 51.8% with symptoms. While there was no difference between the groups in terms of demographic data, it was seen that Group-Re required more mechanical ventilation (MV) support in terms of clinical parameters during the index hospitalization period. The rate of admission to the ICU was 13.15%, and the mortality rate was 10.5% of the patients who readmitted.

Atalla et al. (2) researched the readmissions of patients who were admitted to the hospital due to COVID-19 in the first 30 days after discharge. They stated that the rate of readmitted patients was 6.8%. In our study, this rate was 67.8%. The reasons for this difference are that we only evaluate the patients who were discharged from the ICU, not all the hospital in general, and the readmissions with the aim of control without symptoms were also included into the study.

Yeo et al. (5) investigated the readmissions of COVID-19 patients to the hospital after discharge, and they stated that the most common reason for readmission was respiratory failure. They also reported that these respiratory problems were still present even though the problems were minimized during discharge. Consistent with the literature, in our study, one of the most common reasons in readmissions was dyspnea. As the patients' general medical condition during discharge are unknown, it is unclear whether the cause of dyspnea is due to a new lung problem or a previous sequelae of COVID-19 pneumonia.

Post-viral fatigue is an illness where you feel unwell and tired for a long time after a viral infection. Fatigue is a response that occurs when fighting viral infections such as COVID-19 and often persists after the infection has been treated. This situation may lead to increased need for sleep, balance and concentration problems (6). Fatigue-malaise was another common reason of readmitted patients in our study.

Uyaroglu et al. (7) reported in their study that the mean duration from discharge until readmission was 8.1 days. In our study, we found that this period was 21.34 ± 14.52 days. We consider that the reason for the difference is that we evaluated the first 60 days after discharge in our study.

Long COVID is a new term used to describe the persistent symptoms accompanying patients who were discharged from the hospital after COVID-19 (8). One of the most important of these symptoms is headache (9). It has been reported that headache after COVID-19 should be considered as a chronic sequelae of infection and should not be underestimated (10). In our study, we found that 10.4% of readmissions to the hospital were suffering from headache.

Somani et al. (3), in a study that analyzed the characteristic features of patients readmitted to the hospital after discharge from COVID-19, showed that the length of ICU stay was not a significant parameter for readmission, however the patients who were intubated during index hospitalization returned to the hospital at a higher rate compared with patients who were not intubated. On the other hand, Parra et al. (4) and Uyaroglu et al. (7) showed in their study that patients with higher oxygen needs during hospitalization readmitted to the hospital with a higher rate. Consistent with the literature, in our study, it was observed that while patients in need of MV during hospitalization were admitted to hospital significantly higher, the length of stay in the ICU was not a significant parameter at readmission.

Guarin et al. (11) stated the mortality rate of COVID-19 patients readmitted to the hospital after being discharge as 9%. Donelli et al. (12) in their 2-month readmission rate study, they reported the mortality rate as 9.1%. In our study, we determined that 4 out of 38 patients (10.52%) died at a rate similar to the literature.

The limitations of our study are its retrospective nature and the possibility of patients admitting to other hospitals. In addition, in our study, evaluating only the first 2 months after discharge is also among our limitations.

In conclusion, we found that the rate of readmissions to the hospital in the first 60 days of patients discharged from the ICU after COVID-19 was high with the rate of 67.8%, and they were mostly readmitted with respiratory failure and fatigue-malaise. We determined that the need for mechanical ventilation in the previous hospitalization was a predictive factor for readmission to the hospital. We consider that more comprehensive studies are needed in order to be more prepared the health system, to know the readmission rate and symptoms, and to predict patients who need closer clinical follow-up after discharge.

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Author Contributions

Concept: **Merve Sena Baytar**, Design: **Merve Sena Baytar; Çağdaş Baytar**, Data Collection and/or Processing: **Merve Sena Baytar**, Literature Search: **Çağdaş Baytar**, Writing Manuscript: **Merve Sena Baytar; Çağdaş Baytar**, Critical Review: **Merve Sena Baytar; Çağdaş Baytar**.

Conflicts of Interest

The authors declare that they have no conflict of interest.

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Ethical Approval

Ethics committee approval for the study was obtained from Zonguldak Bülent Ecevit University Clinical Research Ethics Committee (Date: 10/03/2021 and approval No. 2021/05-7)

Review Process

Extremely peer-reviewed and accepted.

REFERENCES

1. World Health Organization. Coronavirus Disease (COVID-19) Situation Reports. 2020. Available online: <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/situation-reports> (accessed on 11 August 2020).
2. Atalla E, Kalligeros M, Giampaolo G, Mylona EK, Shehadeh F, Mylonakis E. Readmissions among patients with COVID-19. *Int J Clin Pract* 2021;75(3):e13700.
3. Somani SS, Richter F, Fuster V, De Freitas JK, Naik N, Sigel K, Nadkarni GN. Characterization of patients who return to hospital following discharge from hospitalization for COVID-19. *J Gen Intern Med* 2020;35(10):2838-2844.

4. Parra LM, Cantero M, Morrás I, Vallejo A, Diego I, Jiménez-Tejero E, Múñez E, Asensio Á, Fernández-Cruz A, Ramos-Martinez A; Puerta de Hierro Hospital Admission Study Group. Hospital Readmissions of Discharged Patients with COVID-19. *Int J Gen Med* 2020;13:1359-1366.
5. Yeo I, Baek S, Kim J, Elshakh H, Voronina A, Lou MS, Vapnik J, Kaler R, Dai X, Goldberg S. Assessment of thirty-day readmission rate, timing, causes and predictors after hospitalization with COVID-19. *J Intern Med* 2021; 290(1):157-165.
6. How to manage post-viral fatigue after COVID-19. Available: <https://www.rcot.co.uk/how-manage-post-viral-fatigue-after-covid-19-0>
7. Uyaroğlu OA, Başaran NÇ, Özişik L, Dızman GT, Eroğlu İ, Şahin TK, Taş Z, İnkaya AÇ, Tanrıöver MD, Metan G, Güven GS, Ünal S. Thirty-day readmission rate of COVID-19 patients discharged from a tertiary care university hospital in Turkey: An observational, single-center study. *Int J Qual Health Care* 2021;33(1):mzaa144.
8. Eroğlu İ, Eroğlu BÇ, Güven GS. Altered tryptophan absorption and metabolism could underlie long-term symptoms in survivors of coronavirus disease 2019 (COVID-19). *Nutrition* 2021;90:111308.
9. Orrù G, Bertelloni D, Diolaiuti F, Mucci F, Di Giuseppe M, Biella M, Gemignani A, Ciacchini R, Conversano C. Long-COVID syndrome? A study on the persistence of neurological, psychological and physiological symptoms. *Healthcare (Basel)* 2021;9(5):575.
10. Martelletti P, Bentivegna E, Spuntarelli V, Luciani M. Long-COVID headache. *SN Compr Clin Med* 2021:1-3.
11. Guarín G, Lo KB, Bhargav R, Salacup G, Wattoo A, Coignet JG, DeJoy R, Azmaiparashvili Z, Patarroyo-Aponte G, Eiger G, Rangaswami J. Factors associated with hospital readmissions among patients with COVID-19: A single-center experience. *J Med Virol* 2021;93(9):5582-5587.
12. Donnelly JP, Wang XQ, Iwashyna TJ, Prescott HC. Readmission and death after Initial Hospital discharge among patients with COVID-19 in a large multihospital system. *JAMA* 2021;325(3):304-306.

