ORIGINAL RESEARCH

Evaluation of Readmitted Patients After Intensive Care Unit Discharge (Retrospective Study)

Yoğun Bakım Ünitesinden Taburcu Sonrası Tekrar Yatışı Yapılan Hastaların Değerlendirilmesi (Retrospektif Çalışma)

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Abstract

Objective: Nearly %10 of the discharged patients are readmitted to intensive care unit (ICU) at the same hospital stay. Reduction of readmission rates could be used as a hospital performance indicator. Our aim is to analyse the reasons and results of readmissions of patients who were discharged to a general ward from ICU in a two-year period.

Method: Readmissions of the patients who had been treated in our ICU between the dates of 01.01.2015-31.12.2016 were analysed retrospectively. Demographic characteristics of patients, readmission rates, initial admission indications and comorbidities, distribution of readmission indications, timing of readmission after discharge, distribution of patients in terms of mechanical ventilation need, discharge time of readmitted patients at initial admission to ICU after weaning, readmission mortality rates, Glasgow Coma Scale (GCS), APACHE-II and SOFA scores of patients at initial admission and readmission were analysed and compared.

Results: 59 patients (3.55%) are readmitted to ICU after discharge at the same hospital stay. When examining the departments where the readmitted patients came from, it is seen that 19 patients (32.2%) were readmitted to ICU from department of general surgery. 22 of readmissions (37.29%) occurred within first 48 hours after discharge. The most common reasons of readmissions are for postoperative monitoring after revisional surgery (44.07%) and acute respiratory failure (40.68%).

Conclusion: The patients who are discharged from ICU are at a high risk of being readmitted to ICU (35). Readmission to ICU is associated with higher mortality risk than the initial admission. The first step of reducing

Öz

Amaç: Taburcu edilen hastaların yaklaşık %10' u yatış süresi içerisinde yeniden yoğun bakım ünitesine (YBÜ) gitmektedir. YBÜ'ye yeniden yatış oranlarındaki azalma, hastane performansında bir kalite göstergesidir. Bu çalışmadaki amacımız, YBÜ'den hastane içine, iki yıllık süre içerisinde taburcu edilen hastaların yeniden yatışlarının nedenlerini ve sonuçlarını analiz etmektir.

Yöntem: 01.01.2015-31.12.2016 tarihleri arasında hastanemiz YBÜ'de tedavi edilen hastaların tekrar yatışları geriye dönük olarak incelendi. Hastaların demografik özellikleri, tekrar yatış oranları, hastaların ilk yatış endikasyonları ve yandaş hastalıkları, tekrar yatışların endikasyonlarına göre dağılımı, tekrar yatışın taburculuk sonrası ne zaman gerçekleştiği, mekanik ventilasyon ihtiyacına göre hastaların dağılımı, tekrar yatışı olan hastaların birinci kabullerinde weaning sonrası taburcu olma zamanı, tekrar yatışlardaki mortalite oranları, hastaların YBÜ'ye ilk ve tekrar yatışındaki Glasgow Koma Skalası (GCS), APACHE-II ve SOFA skorları incelenerek kıyaslandı.

Bulgular: YBÜ'den taburcu edilen ve hastaneden taburcu olmadan tekrar yatışı yapılan hasta sayısı 59 olarak bulundu (%3,55). Hastaların tekrar geldikleri bölümler incelendiğinde en fazla 19 (%32,2) hasta Genel Cerrahi Kliniği'ndendi. Tekrar kabul edilen hastaların 22'si (%37,29) taburcu edildikten sonraki ilk 48 saat içinde gerçekleşti. Tekrar kabul edilen hastaların en sık nedenleri; revizyon cerrahisi sonrasında postoperatif monitorizasyon (%44,07) ve akut solunum yetersizliği (%40,68) olarak belirlendi.

Sonuç: YBÜ'den taburcu edilen hastalar, tekrar YBÜ'ye kabul için yüksek risk altındadırlar. Yoğun bakım ünitesine geri kabul, ilk kabulden çok

Bagcilar Medical Bulletin,
Volume 4, Number 1, March 2019

Öngel Çayören et al.
Evaluation of Readmitted Patients After Intensive Care Unit Discharge

Abstract

the rates of readmission to ICU process is to anticipate the patients who would be readmitted to ICU priorly and improve service wards healthcare quality.

Keywords: Readmission, intensive care unit, critical patient

Öz

daha yüksek mortalite oranları ile ilişkilidir. YBÜ'ye geri kabul oranlarını azaltmadaki önemli adım, önceden hastaları tanımak, tanımlamak ve servis bakım düzeylerini yükseltmektir.

Anahtar kelimeler: Tekrar yatış, yoğun bakım ünitesi, kritik hasta

Introduction

Readmission to intensive care unit (ICU) is frequently seen in critically ill patients (1,2). Nearly %10 of patients who has been discharged from ICU to a ward are being readmitted to ICU at the same hospital stay (3). Readmission is a risky condition; it is associated with increased mortality and longer length of hospital stay (4, 5). Also the financial effects of treatment are remarkable, costs gets higher (6). Decrease in readmission rates to ICU is seen as a quality indicator of a hospital performance (7). First step of lowering readmission rates to ICU is to anticipate which patients could be readmitted.

In this study, our aim is to analyze the reasons and results of readmission to ICU of our hospital at a two year period.

Material and Methods

Readmissions of the patients who had been treated in our ICU between the dates of 01.01.2015-31.12.2016 were retrospectively analyzed by the approval University of Health Sciences İstanbul Bağcılar Training and Research Hospital Ethics Committee dated 27.12.2016 and numbered 2016/526.

Data of patients who were discharged to a general ward from 20 bed ICU and readmitted back in the same hospital stay were obtained from patient files and electronic patient record system.

Demographic characteristics of patients, readmission rates, initial admission indications and comorbidities, distribution of readmission indications, timing of readmission after discharge (within 48 hours it is considered as early readmission), distribution of patients in terms of mechanical ventilation need, discharge time of readmitted patients at initial admission to ICU after weaning, readmission mortality rates, Glasgow Coma Scale (GCS), APACHE-II ve SOFA scores of patients at initial admission and readmission were analyzed and compared.

Comparative statistical analysis was performed with NCSS (Number Cruncher Statistical System) 2007 Statistical Software (Utah, USA). At analysis, descriptive statistical methods (mean value, standard deviation and percentile rank) were used as well as independent samples t-test for the comparison of two-sample groups, paired samples t-test for the comparison of repeated measures and chi-square test for the comparison of qualitative data. We considered $p<0.05$ as statistically significant.

Results

One thousand-nine hundred ninety seven patients received treatment in our ICU during two years period. One thousand-six hundred sixty four patients were discharged (83.32%) and 353 patients died (17.68%) fifty-nine patients (3.55%) were readmitted to ICU after discharge at the same hospital stay (%3.55). Demographic characteristics of patients are shown in Table 1. When examining the departments where the readmitted patients came from, it is seen that 19 patients (32.2%) were readmitted to ICU from department of general surgery. Sixteen patients (27.12%) were readmitted to ICU from department of neurosurgery and 11 patients were readmitted to ICU from department of orthopedics and traumatology (Table 2). Twenty-two

Table 1: Demographic data of the patient: readmitted after intensive care unit discharged

	n=59
Age (year)	61.22±18.80
Gender (M/F)	39/20
Height (cm)	162.75±9.26
Weight (kg)	73.22±7.86
Indication for ICU admission	43 (72.88%) Postoperative monitoring
	5 (8.47%) Polytrauma
	5 (8.47%) Cerebrovascular diseases
	4 (6.78%) Acute respiratory failure
	1 (%) Arrhythmia
	1 (%) Sepsis
Indication for ICU readmission	26 (44.07%) Postoperative monitoring
	24 (40.68%) Acute respiratory failure
	6 (10.16%) Sepsis
	3 (5.08%) Shock

M: Male, F: Female, ICU: Intensive care unit

Öngel Çayören et al.
Evaluation of Readmitted Patients After Intensive Care Unit Discharge

Bagcilar Medical Bulletin,
Volume 4, Number 1, March 2019

patients' readmission (37.29%) occurred within first 48 hours and 37 patients' readmission (62.71%) occurred after the first 48 hours. Twenty-one (35.59%) of 59 readmitted patients died, 38 (64.41%) of them were discharged.

Mean length of stay was 6.58±7.44 days for the living patients and 17.29±15.12 days for dead patients. Second length of ICU stay of dead patients was longer than living patients (p=0.002). When readmitted patients were evaluated, mean initial length of stay was 5.89±10.59 days for living patients and 6.19±10.56 days for dead patients (p=0.878).

Mean length of ICU stay was 6±10.49 days at initial admission and 10.39±11.87 days at readmission. Mean length of ICU stay was longer at readmission than the initial admission (p=0.001).

Glasgow coma scale (GCS), APACHE-II ve SOFA scores of patients at initial admission and readmission were analyzed. Mean GCS score was 13.32±2.58 at initial admission and 11.88±3.29 at readmission. Mean GCS score was lower at readmission than the initial admission (p=0.005). Mean APACHE-II score was 11.46±4.60 at initial admission and 15.47±6.15 at readmission. Mean APACHE-II score was higher at readmission than the initial admission (p=0.0001). Mean SOFA score was 1.59±1.48 at initial admission and 2.66 ± 2.05 at readmission. Mean SOFA score was higher at readmission than the initial admission (p=0.001) (Table 3).

Discussion

Readmission to ICU within 48 hours after discharge is used as an important quality indicator by Society of Critical Care Medicine (8).

In our study, 59 patients have been readmitted to ICU during the same hospitalization (3.55%). There is a wide

Table 2: Distribution of patients with readmission by their clinic

Readmission to ICU from which clinic	Patients (n=59)	%
General surgery clinic	19	32.20
Neurosurgery clinic	16	27.12
Orthopaedics and traumatology clinic	11	18.64
Urology clinic	7	11.86
Internal medicine clinic	3	5.08
Obstetrics and gynaecology clinic	1	1.69
Plastic, reconstructive and aesthetic surgery clinic	1	1.69
Ear, nose and throat clinic	1	1.69

ICU: Intensive care unit

Table 3: Comparison of invasive mechanical ventilation support, GCS, APACHE II Score, SOFA score and length of ICU stay between first admission and readmission

	First admission	Readmission	p
Invasive mechanical ventilation support (%)	35.60%	62.71%	<0.05
GCS	13.32±2.58	11.88±3.29	<0.05
APACHE II Score	11.46±4.60	15.47±6.15	<0.05
SOFA Score	1.59±1.48	2.66±2.05	<0.05
Length of ICU stay (day)	6.00±10.49	10.39±11.87	<0.05

GCS: Glasgow coma scale/score, APACHE: Acute physiology and chronic health evaluation, SOFA: Sequential organ failure assessment, ICU: Intensive care unit

range of readmission rates (5-17.5%) in various studies (1,2). Readmission rate was 9.6% in a study by Jo et al. (9). Rate of readmission to ICU within 48 hours after discharge and within 120 hours after discharge were 2% and 3.7% respectively in a study by Brown et al. (10). Our readmission rate is slightly less than that reported in the literature.

According to Amin et al. (1), reasons of readmission to ICU are deterioration or relapse of the disease, newly emerged complications irrelevant to initial admission and purpose of follow up with the patients who needs repeating surgery. In a study by Rosenberg et al. (4), it is reported that intensification of symptoms due to improper or delayed treatment may lead to readmission. Prolonged hospital stay and being older than 70 are amongst the risk factors associated with readmission to ICU. Cardivascular and respiratory system problems are prominent causes of readmission (11). Gajic et al. (12) highlight the importance of prolonged ICU stay and lower GCS at the day of discharge. Risk factors for readmission to pediatric ICU are being younger, emergency indications and the critical condition at initial admission (13). Male sex, history of DM, application of continuous renal replacement therapy (CRRT) during ICU stay, white blood cell count on the day of extubation and heart rate just before ICU discharge are also associated with increased risk of ICU (9). When examining the departments where the readmitted patients came from, it is seen that largest number of patients (32.2%) were readmitted to ICU from general surgery clinic because of respiratory failure which is a result of repetitive surgeries for the medical condition.

37.29% of patients' readmissions occurred within the first 48 hours after discharge from ICU. In the literature, cases of readmissions within 48 hours after discharge from ICU are considered as early discharges. Nearly 22-30% of the patients are early discharged (14,15). Our early discharge

Bagcilar Medical Bulletin,
Volume 4, Number 1, March 2019

Öngel Çayören et al.
Evaluation of Readmitted Patients After Intensive Care Unit Discharge

rate is higher than that reported in the literature and the most probably reason for this is the bed scarcity that can't meet the high demand. However, there is no mortality rate difference between the patients who are readmitted to ICU within 48 hours or after 48 hours. Brown et al. (10), reported that there is no association between length of ICU stay and readmission to ICU within 48 hours after discharge. Risk factors for readmission within 48 hours are severity of disease, functional condition, length of mechanical ventilation, chronic respiratory or renal disease, chronic immunosuppression and presence of a solid organ tumour (10).

Readmission to ICU is directly proportional to the severity of disease scores (15,16). GCS scores of our patients at readmission are lower than the initial admission. Mean APACHE-II scores at readmission are higher than the initial scores. Chan et al. (7) reported that APACHE-II scores of the patients who were readmitted to ICU and eventually died are the highest and higher APACHE-II score is associated with increased mortality risk. In our study, also average SOFA scores of patients at readmission are higher than the initial admission scores. Higher SOFA score measured at any time during ICU stay is associated with older age, emergency surgery and readmission to ICU (17).

Length of stay is longer and mortality rates are higher at readmission in our study. In a study by Wong et al. (18) the patients who were readmitted to ICU had longer length of stay and their mortality rates significantly increased. It is showed that nearly 22-44% of the patients had been early disharged from ICU (19). Rate of readmission to ICU is considered as a quality indicator, because it can be easily measured. Especially, rate of readmission within the first 48-72 hours after discharge is advised as a clinical performance criteria (20). Even though readmission to ICU is associated with early discharge from ICU and poor clinical outcomes, there are considerable amount of studies in which there is not a convincing connection between readmission and objective quality criterias of an ICU (21,22). It is seen that 10 of 21 patients (47.62%) who needed mechanical ventilation at readmission to ICU have been discharged within first 48 hours after weaning. It is possible to say that if the patients' length of stay at ICU after weaning is shorter than 48 hours, they will be more likely to readmitted to ICU. We believe that the reason of this is the scarcity of bed capacity which is not enough for high demand and the new patients who require ICU care. Early discharge from ICU is one of the most important risk factors for the increased mortality

(23). In a study from USA in which more than two hundred thousand discharges from ICU to general wards have been examined retrospectively from hundred and fifty five ICUs, it is understood that length of ICU stay of the patients' gets shorter at the times when the demand for ICU beds arises (24). The patients are more likely to be readmitted to ICU after discharge at these times and it shows us that variations of ICU bed availability is so important that it could effect clinicians' triage decisions. In this high-volume study, despite the pressure of increased demand on triage decisions, in-hospital mortality rate and the probability of home discharge were not negatively effected. Strain spurs providers to reduce their provision of what seems to be low-value care by critically re-examining needs for ICU-level care and transferring patients who could be equally well-managed outside the ICU setting (25,26). Consequently, readmission rates are lower in hospitals which have more ICU beds (27).

Respiratory failure is the most common reason of readmission to ICU in our study. For this reason, after discharging to general wards from ICU we may advice respiratory physiotherapy practices including aspiration, percussion and postural drainage by healthcare providers and a respiratory therapist which might be very beneficial and even could lower the readmission rate.

Choosing the right time to discharge a patient from ICU still remains a challenge (28). Discharging from ICU is protective against iatrogenic and nasocomial complications during ICU stay and it makes ICU available for efficient use and decreases costs (29). When considering the rewards, the decision of discharge from ICU may have some level of risk (30). Unfortunately, after being discharged from ICU to health facilities, the patients are at the risk of reduced monitoring which could lead to delayed recognition of probable complications and clinical deterioration (31,32,33).

Conclusion

In conclusion, the patients who are discharged from ICU are at a high risk of being readmitted to ICU (34). Readmission to ICU is associated with higher mortality risk than the initial admission (35). Considering the funding for ICU services which consumes substantial amount of health resources, a decrease in the readmission to ICU rates can be used as a hospital performance indicator (36-38). The first step of reducing the rates of readmission to ICU process is to anticipate the patients who would be readmitted to ICU priorly and improve general wards healthcare quality (39-41).

Öngel Çayören et al.
Evaluation of Readmitted Patients After Intensive Care Unit Discharge

Bagcilar Medical Bulletin,
Volume 4, Number 1, March 2019

Ethics

Ethics Committee Approval: The study was approved by the University of Health Sciences İstanbul Bağcılar Training and Research Hospital Ethics Committee dated 27.12.2016 and numbered 2016/526.

Informed Consent: Retrospective study.

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Authorship Contributions

Surgical and Medical Practices: P.Ö.Ç., K.E., M.S.S., S.D., H.Ç., Concept: P.Ö.Ç., K.E., A.S., Design: P.Ö.Ç., K.E., A.S., Data Collection or Processing: P.Ö.Ç., M.S.S., S.D., H.Ç., Analysis or Interpretation: P.Ö.Ç., K.E., A.S., Literature Search: P.Ö.Ç., K.E., M.S.S. Writing: P.Ö.Ç., K.E., H.Ö.

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Bagcilar Medical Bulletin,
Volume 4, Number 1, March 2019

Öngel Çayören et al.
Evaluation of Readmitted Patients After Intensive Care Unit Discharge

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