Original Article

HEALTH SCIENCES
MEDICINE

DOI: 10.32322/jhsm.1316989
J Health Sci Med. 2023;6(5):919-924

Analysis of consultations requested from the tertiary intensive care unit and response times: a retrospective study

Mehmet Çağatay Gürkök[1], Özlem Öner[2], Ferhan Demirer Aydemir[3], Özge Kuzgun[4], Alkan Durmuş[5], Sabri Erdem[6], Ali Necati Gökmen[2],

[1]Division of Intensive Care, Department of General Surgery, Faculty of Medicine, Dokuz Eylül University, İzmir Turkey
[2]Division of Intensive Care, Department of Anesthesia and Reanimation, Faculty of Medicine, Dokuz Eylül University, İzmir, Turkey
[3]Division of Intensive Care, Department of Internal Medicine, Faculty of Medicine, Dokuz Eylül University, İzmir, Turkey
[4]Division of Intensive Care, Department of Anesthesia and Reanimation, Sakarya Training and Research Hospital, Sakarya, Turkey
[5]Department of Business Administration, Institute of Social Sciences, Dokuz Eylül University, İzmir, Turkey
[6]Division of Numerical Methods, Department of Administration, Faculty of Business, Dokuz Eylül University, İzmir, Turkey

Cite this article as: Gürkök MÇ, Öner Ö, Demirer Aydemir F, et al. Analysis of consultations requested from the tertiary intensive care unit and response times: a retrospective study. *J Health Sci Med.* 2023;6(5):919-924.

Received: 23.06.2023 ◆ **Accepted**: 16.08.2023 ◆ **Published**: 28.09.2023

ABSTRACT

Aims: It is aimed to evaluate the effectiveness of the consultations and response times requested from the Intensive Care Unit on the cost.

Methods: This study was conducted retrospectively in a 16-bed anesthesia intensive care unit (ICU) between 02.01.2019 and 30.12.2019. Patient information from the hospital data system was analyzed. Accordingly, demographic data, hospitalization diagnoses, departments for which consultation was requested, times of request, response times, and the average cost per day of a patient were investigated.

Results: It was determined that consultation was requested from a total of 522 patients, 223 (43%) of the patients were female, 299 (57%) were male, and the age range was 18-98 (mean age 57). It was found that the average consultation response time in all departments was 4.09 hours outside of working hours and 3.54 hours during working hours. There was no significant difference in the response time of consultations between internal and surgical departments. The daily cost of one patient in the ICU was found to be 2380.39 ₺.

Conclusion: Failure to promptly respond to the requested consultations in the intensive care unit may cause delays in patients' treatment and their discharge to the service. This situation increases the patient's length of stay and causes the intensive care units not to be used effectively and correctly. However, it can also increase morbidity and cost.

Keywords: Intensive care unit, consultation, response time, morbidity, cost

INTRODUCTION

Intensive care unit (ICU); it is a multidisciplinary unit with high operating costs, equipped with advanced technology devices that are privileged in terms of patient care, monitoring of vital signs for 24 hours, treatment and follow-up of patients who are at risk of losing or losing some or all of their vital functions.[1] Interdisciplinary communication and treatment approaches are often required to diagnose and treat patients admitted to the ICU. Comprehensive critical care support (Comprehensive Critical Care Outreach, 3CO) has emerged in the last two decades, and its multidisciplinary approach in the ICU provides a safe and rapid approach to acutely unidentified critical patients.[2] In order to approach a case holistically, it is inevitable for more than one clinical medicine discipline to work together.

Consultation, derived from the Latin word "consultatio," is the meeting of two or more physicians who are experts in different branches at a patient's office and making a joint evaluation of that patient upon the request of the patient or his family or the need of the treating physician, in the face of a not fully elucidated case or a disease that is difficult to diagnose. Can be defined as.[3] In this case, the "consultant physician" is the physician from whom the patient is consulted and whose knowledge and opinions are sought.

ICU provides consultation services in our country according to the regulation published by the Ministry of Health and each institution's configuration and possibilities.[4] Due to the high demand for intensive care units, evaluating intensive care beds and their resources efficiently and effectively is essential.[5]

Corresponding Author: Mehmet Çağatay Gürkök, mcgurkok@yahoo.com

Consultations are one way of doing this, and there are several reasons. During the visit, the intensive care team asks for consultation from other services. Many departments may request consultations during the perioperative period, such as surgical branches for patient follow-up, infectious diseases for infection treatment, oncology for various oncological diseases, and nephrology consultation for hemodialysis needs.[2]

After the completion of intensive care treatments, consultation is also required for the discharge or transfer procedures of patients who do not indicate hospitalization. After the decision to transfer the patients from the intensive care unit to another service (palliative care, a lower level intensive care unit, inpatient services) is made, the opinion of the relevant branch is taken.

Our aim in this study is to determine the response times to the desired consultations regarding treatment planning or discharge to the service while being treated in the intensive care unit and to evaluate the cost of delays, if any.

METHODS

The study was carried out with the permission of Dokuz Eylül University Non-interventional Clinical Researches Ethics Committee (Date: 26.10.2020, Decision No: 2020/26-45). All procedures were carried out in accordance with the ethical rules and the principles of the Declaration of Helsinki. We retrospectively reviewed the patients hospitalized in the 3rd level anesthesia intensive care unit with 16 beds and over 18 years of age between 02.01.2019 and 30.12.2019. patients were evaluated. Our study is a cross-sectional analytical study. All consultations requested from the anesthesia intensive care unit within the specified period were evaluated by examining the electronic records in the hospital information management system. All patients over 18 treated in the intensive care unit who completed or met the criteria for leaving the intensive care unit and were consulted for transfer to another service were included in the study.

Pediatric patients under the age of 18, drug consent consultations, consultations requested for repetitive consultations, and physiotherapy purposes were determined as exclusion criteria from the study. The demographic data of the patients, age, gender, and hospitalization diagnoses, from which internal or surgical service the requested consultations were made, whether the requested time was in or out of working hours, and the response times were recorded in the www.veritopla.biz.tr program, which is the data collection base of our department. The identity information of the patients was not used in the study. The departments for which consultation was requested were divided into internal and surgical departments according to their areas. internal departments were accepted as dermatology infectious diseases, chest diseases, cardiology, neurology, mental health and diseases radiology, endocrinology, gastroenterology, hematology, nephrology, and oncology clinics. surgical departments; neurosurgery, general surgery, ophthalmology, thoracic surgery, cardiovascular surgery, otorhinolaryngology, orthopedics and traumatology, plastic and reconstructive surgery, and urology were accepted as clinics.

In addition, the average daily cost of a patient in the anesthesia intensive care unit was calculated. While making the calculation, the daily ICU cost of a patient was subtracted. All laboratory tests requested and/or applied from the patient during the day, imaging methods, drug costs, blood components, consultation costs, tertiary intensive care unit hospitalization costs, percutaneous tracheostomy performed in the hospital, pleural drainage, central venous catheter application, tube thoracostomy, etc. The direct medical cost covering the costs of the applications was calculated as Turkish lira (₺) from the Social Security Institution (SGK) perspective. Direct medical costs (service fee, drug cost, material cost, etc.) were calculated by dividing the total cost by the total number of days invested, using the invoice information of the patients in the Probel Hospital Information Management System (Probel HBYS).

Statistical Analysis

The study's data were transferred to the SPSS 24.0 (Windows, Chicago, IL, USA) program. Categorical data were expressed by frequency and percentage, while continuous data were represented by mean, standard deviation, median, minimum, and maximum. Categorical data were compared with the Chi-square test. The conformity of the consistent data to the normal distribution was tested with the Shapiro-Wilkonson test. When comparing the means, the t-test was used for data with normal distribution, and the Mann-Whitney U test was used for data unsuitable for normal distribution. The significance level was accepted as $p < 0.05$.

RESULTS

In light of the data obtained by retrospectively examining our hospital database, it was determined that 522 patients were consulted. When the demographic data of the patients were examined, it was seen that 223 (43%) were female and 299 (57%) were male, and the age range was 18-98 (mean age 57). In the gender analysis of the requested consultations, no gender difference was found between the male and female gender.

When the consultations requested are classified according to the diagnosis groups, the most consultation is respiratory diseases (24.7%), circulatory system diseases

(23%), and digestive system diseases (18.2%) are the third (Table 1). The number of consultations requested from internal departments was higher than in surgical departments.

Table 1. Classification of consultations according to their diagnosis

	Number (n=522)
The respiratory system	129 24.7
The circulatory system	120 23.0
Digestive system	95 18.2
Neurology	73 14.0
Trauma	62 11.9
Oncology and hematology	27 5.2
Endocrine-nutrition	8 1.5
Suicidal	6 1.1
Other	2 0.4
Total	522 100.0

It was found that the average consultation response time in all departments was 4.09 hours outside of working hours and 3.54 hours during working hours. There was no significant difference between internal and surgical departments regarding response times. When the timing of the consultations was analyzed, there was no significant difference between internal and surgical departments in terms of in and out of working hours (p>0.05) (Table 2).

When the consultation response times were analyzed according to departments, a significant difference was found between the response times of cardiology, plastic& reconstructive surgery, and chest diseases compared to other departments (p>0.05) (Table 2).

One-day tertiary anesthesia intensive care cost of a patient; Dividing the available total (4,931,409.33) by the total number of days hospitalized (2071,6835), it was found to be 2,380,39 ₺ (Table 3).

Table 3. Anesthesia intensive care unit cost table

	(₺)
Service fee	1.884.697,08
Medication fee	2.453.575,13
Material cost	593.137,12
Grand total	4.931.409,33
Cost per patient per day	2.380,39

DISCUSSION

Our study analyzed the consultations requested in the anesthesia intensive care unit for one year. The number of consultations requested from the internal departments was higher than the surgical departments. As the diagnostic group, consultations for respiratory diseases were first. It was found that the average consultation response time in all departments was 4.09 hours outside of working hours and 3.54 hours during working hours. There was no significant difference between internal and surgical departments regarding consultation response times. However, it was determined that the consultation response times of the cardiology, chest diseases, and plastic and reconstructive surgery clinics were significantly different regarding the response times of the requested consultations during working and non-working hours.

Table 2. Distribution of consultations by units

Desired Unit	During working hours (n=577)	During working hours Mean+SD	Out of hours (n=544)	Out of hours Mean+SD	p
Department of Neurosurgery	29	(5.19±7.51)	28	(4.56±3.52)	0.51
Department of Dermatology	8	(12.22±11.85)	10	(6.28±8.68)	0.20
Department of Endocrinology	1	(.8333±)	3	(4.56±1.830)	0.50
Department of Infectious Diseases	305	(2.73±2.72)	154	(2.76±2.63)	0.25
Department of Gastroenterology	8	(12.22±11.85)	24	(4.21±2.90)	0.36
Department of General Surgery	32	(3.80±3.81)	59	(4.76±4.46)	0.10
Department of Thoracic Surgery	12	(2.79±2.77)	14	(4.91±6.82)	0.25
Department of Chest Diseases	23	(4.02±7.01)	32	(4.51±5.32)	0.015
Department of Eye Diseases	6	(4.41±4.341)	10	(4.51±5.32)	0.43
Department of Hematology	5	(14.86±25.85)	11	(3.84±1.120)	1.00
Department of Cardiovascular Surgery	10	(4.90±3.60)	19	(3.07±2.61)	0.14
Department of Cardiology	34	(6.32±5.16)	45	(3.68±3.50)	0.019
Department of Ear Nose Throat Diseases	7	(3.54±2.94)	21	(3.68±3.50)	0.09
Department of Nephrology	32	(2.31±2.04)	29	(3.21±4.22)	0.50
Department of Neurology	32	(5.77±7.275)	32	(3.26±3.20)	0.82
Department of Oncology	3	(2.36±.035)	3	(6.26±2.69)	0.10
Department of Orthopedics and Traumatology	8	(7.68±6.21)	15	(5.43±3.376)	0.55
Department of Plastic and Reconstructive Surgery	7	(3.74±2.17)	8	(11.24±5.57)	0.021
Department of Radiology	3	(6.28±2.65)	5	(11.24±5.57)	1.00
Department of Mental Health and Diseases	4	(4.46±3.03)	10	(4.12±1.76)	0.84
Department of Urology	8	(3.90±5.19)	12	(4.12±1.76)	0.57

All values were presented as percent or mean±standard deviation (SD).

According to the guideline containing the decisions for admission and discharge to the ICU published in 2019, it is recommended that the consultations requested from the ICU be answered by the relevant consultant physician within 30 minutes, 7 days a week, 24 hours a day, by coming to the intensive care unit and, if necessary, by making two visits a day.[6] According to the consultation procedure updated by our university in 2017, the consultation response mentioned among the physician's responsibilities should be quick and effective.[7] The consultant physician should evaluate the patient within 30 minutes at the latest in the emergency consultations requested from the emergency services. However, our ICU within our hospital has the same status as other inpatient services and has no priority regarding consultation response time. According to the same consultation procedure, the consultations requested from the services must be evaluated within the working hours within 24 hours.

Since the consultations requested from the ICU are within the scope of inpatient service, there may be problems in terms of functioning; we think it would be appropriate to consider ICU consultations as an emergency service. While the consultations requested from the ICU are answered promptly, treatment plans should be evaluated with the intensive care unit and the consultation officer.[8] Rapid consultation and joint evaluation reduce critically ill patients' mortality and their ICU stay.[5] However, it was observed that the consultation response time in our unit was far beyond these times.

It is essential to work multidisciplinary in the operation of the ICU, seek consultations from various services when needed, and answer these consultations as soon as possible. Consultations are requested for very different and vital situations, such as the infectious status of the patients, the need for hemodialysis, psychiatric evaluation, possible operation decision, and evaluation of the patient in terms of follow-up in the postoperative period. In a study that performed a descriptive analysis of neurological consultations in non-neurological ICUs to determine the frequency of various neurological complications and to evaluate the diagnostic yield, therapeutic effects, and prognostic utility of these consultations, it was found that 48% of patients had treatment change following neurological consultation and was beneficial for their prognosis.[9]

Consultation response time is of fundamental importance in infectious processes such as sepsis. The last published sepsis guideline states that the most appropriate antimicrobial should be started in sepsis patients within the first hour.[10] Delayed antimicrobial therapy is associated with a significantly increased mortality risk. In another study, each hour of delay in antibiotic treatment was found to decrease the chance of survival by 7.6%.[11] In support of this situation, some studies advocate 24/7 accessibility to the infectious diseases specialist in the ICU and emphasize the importance of meeting face-to-face daily.

Therefore, delayed consultation response in infectious processes may increase the morbidity and mortality rates of the cases.[12] In order to increase the rational use of antibiotics, reduce the cost of treatment and reduce antibiotic resistance, the authority to prescribe antibacterial, antifungal, and antiviral agents has been granted to infectious diseases and clinical microbiology specialists (EHU) under the heading of antibiotic prescribing rules in the Health Practice Communiqué (SUT) published by the Social Security Institution since 2005.[13] Antimicrobials in SUT; are divided into three groups those that do not have restrictions, those that do not require approval up to 72 hours for their prescription, and those that require absolute Infectious Diseases and Microbiology specialist approval.

However, considering the inpatient profile in the 3rd level ICU, prescribing following the guidelines by intensive care specialists, who also have Infectious Diseases rotation in the specialty medicine core training program, may contribute to the reduction of morbidity and mortality, especially in septic patients, so that there is no delay in the treatment of complicated patients. In addition, it is essential to use early warning systems in critical laboratory results for patient safety and to perform imaging procedures as soon as possible.[12] In this context, legal regulation may benefit the intensive care specialist to prescribe antibiotics, antiviral and antifungal drugs.

Early and timely consultation is crucial in transferring critically ill patients to the service. It has been reported that delayed admission from the ICU to the ward increases the length of hospital stay and causes significant morbidity and mortality.[14] The ICU decisions guide recommends that the patient goes to the service within 4 hours after the ICU officer decides to leave the patient.[15] In our unit, due to the length of the response time for out-of-hours consultations and the fact that the patient is expected to go to the service during the daytime, the hours of going to the service follow the guideline.

Another dimension of delayed admission of critically ill patients to the service is the inability to use hospital and country resources effectively. ICUs consume 20% of hospital expenditures and 1% of gross domestic product.[16] Due to the high demand for intensive care, intensive care beds, and resources must be utilized efficiently and effectively.[17] Consultation from the relevant branch is requested When transferring patients from intensive care to another service (palliative care, a lower-level intensive care unit, inpatient service). Delayed response to the

desired consultation causes prolonged patient stays in the ICU, increased morbidity and mortality, and additional costs.[16]

The daily cost of an intensive care bed is 6-8 times higher than that of a service bed.[18] In a study by Yıldız et al.[19] the total cost of 20 patients who could not be removed from the intensive care unit due to delayed consultation or other reasons for 1 year was 6058±12676.63 ₺ (min:160).-max: 58780). In our study, when a patient's one-day tertiary anesthesia intensive care cost was calculated, it was found to be 2,380.39 ₺. Due to the high costs, the unnecessary occupation of intensive care beds due to delayed response to consultation not only puts an extra burden on the health system but also increases the morbidity and mortality of the patients. Considering the number of intensive care beds in Turkey, we can predict that the cost can reach high figures.

Dimitra Karabatsoua et al.[20] in a study they conducted in a 7-bed 3rd-level intensive care unit in 2016 in Greece, the average daily cost was calculated as 573.[18] Euros, and they stated that the shortening of the stay in the intensive care unit and the decrease in the duration of mechanical ventilation caused a significant decrease in total costs. Dasta et al.[21] stated that interventions that shorten the length of stay in the intensive care unit cause significant reductions in the total cost of inpatients. Lefrant et al.[22] found the total daily cost of 104 patients in intensive care in France to be 1425±520 € (95% CI=1323-1526 €) and strongly correlated the average cost of ICU with the duration of care per bed performed by human resources.

For these and similar reasons, delay in responding to the requested consultations may adversely affect the treatment of patients, cause prolonged morbidity and mortality, and ultimately impose a severe burden on the health system.

CONCLUSION

Due to the multidisciplinary study, consultation is requested from the patients hospitalized in our intensive care unit for different reasons. The response time of the consultations is important both in terms of making the best follow-up and treatment plans for the patients and not disrupting them, and in terms of the cost to the health system of the patients who cannot be taken to the service outside the patient. In our study, although the cost of patients treated in the intensive care unit was calculated, the cost of delayed consultations was not calculated. For this purpose, further studies are needed.

We aim to investigate the causes of delays in consultation response time based on this study, develop preventive strategies (SMS model, etc.) and conduct new studies investigating both the clinical and cost consequences of this delay and ensure that intensive care is effective, efficient and less costly contribute to its use.

ETHICAL DECLARATIONS

Ethics Committee Approval: The study was carried out with the permission of Dokuz Eylül University Non-interventional Clinical Researches Ethics Committee (Date:26.10.2020, Decision No: 2020/26-45).

Informed consent: Because the study was designed retrospectively, no written informed consent form was obtained from patients.

Referee Evaluation Process: Externally peer reviewed.

Conflict of Interest Statement: The authors have no conflicts of interest to declare.

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

Author Contributions: All the authors declare that they have all participated in the design, execution, and analysis of the paper, and that they have approved the final version.

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