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Original Article

Study of hospitalization status of patients with COVID-19 in Dr. Masih Daneshvari Hospital in Tehran

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Abstract

***Background & Aims*:** The COVID-19 pandemic, caused by a novel coronavirus, has infected over 91 million people globally, with Iran being severely impacted, reporting 7.6 million cases and nearly 946,837 deaths. This study examines hospitalization trends among COVID-19 patients in Iran to improve resource allocation and patient care.

***Materials & Methods*:** A cross-sectional analysis was conducted using data from 4,372 confirmed COVID-19 patients admitted to Dr. Masih Daneshvari Hospital in Tehran during the first 50 days of the outbreak. The study evaluated admissions to general wards and intensive care units (ICUs).

***Results*:** Findings revealed an average daily hospitalization rate of 193.86 patients, with 149.42 (76.94%) admitted to general wards and 44.44 (23.06%) to ICUs. Over time, general ward admissions showed a declining trend, while ICU admissions increased, indicating a potential rise in severe cases.

***Conclusion*:** The study underscores the importance of monitoring hospitalization patterns to optimize medical resources, including equipment, medications, and staffing. By understanding these trends, healthcare systems can enhance hospital efficiency and improve patient care during future outbreaks.

***Keywords*:** COVID-19, Disease severity, Epidemic, General ward, Hospitalization status, Intensive care unit

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Introduction

With the first reported coronavirus disease (COVID-19) death in Qom on February 19, 2020, Iran experienced a widespread outbreak, resulting in over 7.6 million confirmed cases and nearly 146,837 deaths, making it one of the most severely affected countries in the Middle East (1, 2). COVID-19 is an acute respiratory infection caused by a new coronavirus (3). The disease is the most important public health challenge in the world, which emerged in December 2019 in Wuhan, China, and rapidly spread to other countries around the world, eventually causing a pandemic (4-5).

Coronaviruses include a large family of viruses that are commonly found in both humans and animals; this family consists of seven different species (3). Sometimes types of coronavirus can infect humans through animals and spread through human-to-human transmission, such as the virus that causes COVID-19 (6). Although this virus is less dangerous in terms of mortality than other emerging viruses from the coronavirus family, such as SARS and MERS, it has spread rapidly and has shown special pathogenic behaviors that have made it very difficult to control (7-9).

The most common and severe manifestation of this infection is pneumonia. These patients typically develop symptoms an average of 5 days after the onset of the disease (10-11). About 85% of patients with confirmed COVID-19 infections experience mild to moderate disease and do not require specialized treatment (11-12). These patients recovered with home isolation and were eventually admitted to public wards due to a history of underlying diseases. About 15% experienced severe symptoms (such as dyspnea, increased respiratory rate over 30 breaths per minute, blood oxygen saturation below 93%, PaO_2/FiO_2 less than 300, or lung involvement more than 50%), and they needed to be hospitalized in the intensive care unit (ICU) (11-12). Less than 6% of these patients developed critical COVID-19 (acute respiratory distress syndrome, heart failure, septic shock, multi-organ failure) (11). Due to the importance of COVID-19 as a serious global pandemic, one of the issues that need to be addressed to improve patient care is to ensure the availability of necessary equipment and medical care facilities in hospitals (4, 13-14).

Usually, some patients with COVID-19 need to be hospitalized in the general ward or the ICU due to the severity of the disease, clinical symptoms, and history of underlying diseases such as asthma, immune deficiency disorders, cardiovascular diseases, liver and kidney diseases, and cancers (8, 13-14). The fact that a number of patients with COVID-19 are admitted to the general ward and some to the ICU demonstrates the importance of attention and the estimation of the necessary medical equipment, treatment, and care facilities for these patients in hospitals.

This research is significant not only for understanding the immediate impacts of the pandemic but also for informing future healthcare strategies amid the current challenges in Iran's healthcare infrastructure. Currently, Iran has developed a comprehensive healthcare infrastructure, which includes over 500 regional health centers and approximately 4,600 Comprehensive Health Care Centers (CHCs) located even in remote areas. Additionally, around 18,000 community-based health houses, staffed by trained community health workers (Behvarz), provide essential health services and referrals to rural populations (1). By studying the hospitalization statistics of patients with COVID-19, health authorities will be able to determine the amount of medical equipment, supplies, medicines, and staff needed in the general ward and ICU. This will increase the efficiency of hospitals and medical centers in providing services to patients with COVID-19. Therefore, the aim of this study was to evaluate the hospitalization status of patients with COVID-19 at Dr. Masih Daneshvari Hospital, Tehran.

Materials & Methods

In this cross-sectional study, the patients' hospitalization status was evaluated based on information collected from 4,372 confirmed COVID-19 patients who were hospitalized in the general ward and ICU at Dr. Masih Daneshvari Hospital in Tehran during the first 50 days of the onset of the COVID-19 epidemic.

Dr. Masih Daneshvari Hospital is a university medical center and a COVID-19 referral center in Tehran, Iran. Data were collected through clinical records of patients who were hospitalized in the general ward and ICU. Based on this information, the number of daily hospitalizations of patients with COVID-19 as well as the percentage of daily hospitalizations in the general ward and ICU during the 50 days from the onset of the epidemic was assessed. Data analysis was conducted using STATA software version 14 and SPSS software version 19.

In this study, the daily percentage of patients with COVID-19 who were admitted to the general ward was calculated according to the following formula:

$$\frac{The\ daily\ ratio\ of\ patients\ with\ COVID-19\ admitted\ to\ the\ general\ ward}{The\ total\ number\ of\ patients\ with\ COVID-19\ admitted\ on\ the\ same\ day}\times 100$$

Also, the daily percentage of patients admitted to the ICU was obtained based on the following formula:

$$\frac{The\ daily\ ratio\ of\ patients\ with\ COVID-19\ admitted\ to\ the\ ICU}{The\ total\ number\ of\ patients\ with\ COVID-19\ admitted\ on\ the\ same\ day}\times 100$$

Results

According to the results of the present study, during the 50 days from the onset of the COVID-19 epidemic, 4,372 confirmed patients were referred to Dr. Masih Daneshvari Hospital in Tehran and were admitted to the general ward and ICU. On average, the number of daily COVID-19 hospitalizations was about 193.86 patients, of which 149.42 were admitted to the general ward and 44.44 to the ICU (Table 1). The highest number of patients admitted in a single day was 192 to the general ward and 57 to the ICU.

The results of the study showed that, on average, 76.94% of patients were admitted to the general ward and 23.06% to the ICU (Table 1). Evaluation of the hospitalized COVID-19 patients indicated that most were admitted to the general ward due to less severe clinical symptoms. The number of patients admitted to the general ward during the first 25 days after the onset of the COVID-19 epidemic showed an upward trend and in the second 25 days, this number slightly decreased (Figure 1). The number of hospitalized patients with COVID-19 in the ICU showed an upward trend during the first 15 days from the beginning of the epidemic, and after this period, the trend remained relatively stable (Figure 1).

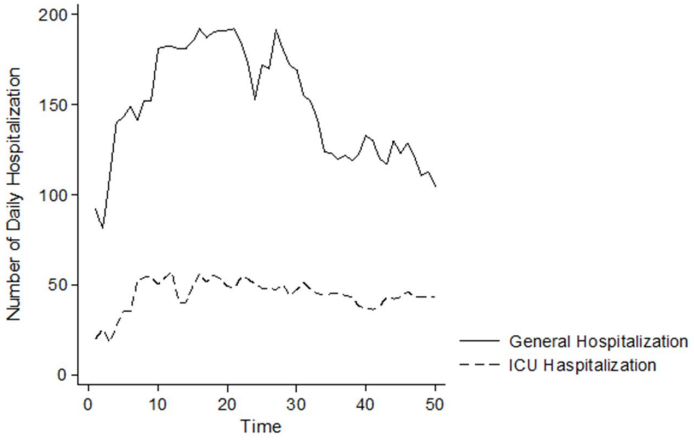

Fig. 1. The trend of daily hospitalization of patients with COVID-19 in general wards and ICU of Dr. Masih Daneshvari Hospital in Tehran

Table 1. Hospitalization status of patients with COVID-19 in Dr. Masih Daneshvari Hospital in Tehran

Variable	Mean	Standard deviation	Minimum	Maximum
Number of daily hospitalizations in the general ward	149.42	30.92	81	192
Number of daily hospitalizations in the ICU	44.44	8.67	18	57
Percentage of daily hospitalization in the general ward	76.94	3.33	70.94	85.94
Percentage of daily hospitalization in the ICU	23.06	3.27	14.06	29.05

During the 50 days since the onset of the COVID-19 epidemic, the percentage of hospitalizations fluctuated at approximately 80% in the general ward and 20% in the ICU (Figure 2). An interesting point in this study is that, over time, the percentage of the daily number of hospitalized patients showed an almost decreasing trend in the general ward, while this figure showed an increasing trend in the ICU (Figure 2). Although these changes are imperceptible, approximately 0.22% of the daily admissions of patients with COVID-19 in the general ward decreased and was added to the hospitalization rate of patients in the ICU.

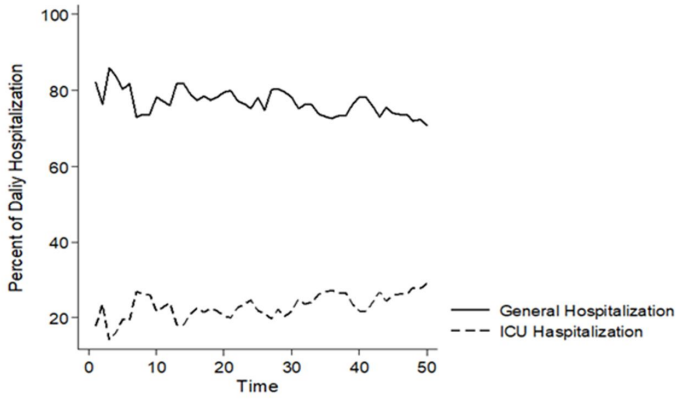

Fig. 2. The percentage of daily hospitalization of patients with COVID-19 in general wards and ICU of Dr. Masih Daneshvari Hospital in Tehran

Discussion

The COVID-19 pandemic officially began in Iran after the first recorded death on February 19, 2020, in Qom. The virus rapidly spread across all provinces, with a peak of approximately 3,200 daily cases by the end of March 2020, posing significant challenges for both public and health authorities (15, 2). Faced with a global shortage of personal protective equipment (PPE) and medical supplies, along with restrictions on international financial transactions, Iran's healthcare system struggled to meet the increasing demands of the pandemic (1, 15). Research indicates that the pandemic had a profound impact on healthcare utilization across various services in Iran. Studies revealed a significant decline in the use of healthcare services during the early stages of the pandemic, although a gradual increase was observed over time (15). This phenomenon was attributed to the fear of contracting the virus as well as quarantine measures that discouraged individuals from seeking essential medical care. The resilience of Iran's healthcare system was tested, leading to proposals for the use of telemedicine to maintain healthcare delivery during the crisis (15-16). Throughout the pandemic, Iran has recorded over 7.6 million confirmed cases and nearly 146,837 deaths (2). These statistics place Iran among the most severely affected countries in the Middle East, experiencing multiple waves of COVID-19 infections that have shown variations in clinical

outcomes based on the circulating virus types at different times (17).

The spread of COVID-19 around the world has created a significant international challenge, and many countries have been affected by the disease to date (6). From the beginning of the outbreak, researchers have used a wide range of medicines and treatments to manage the disease (13-14, 18). Since many aspects of COVID-19 are still unknown, both the source of the disease and its treatment remain a mystery (11, 19).

One of the most important issues regarding COVID-19 is the estimation of the necessary medical equipment, treatment, staff needed, and care facilities for these patients in hospitals. Various studies have shown that about 80 to 85% of patients with COVID-19 experience a mild to moderate form of the disease, and around 15 to 20% experience severe and acute symptoms (10-12). Most patients recover with home quarantine treatment without intervention. However, some of these patients need to be admitted to the general ward or ICU due to underlying diseases as well as severe and acute forms of the illness (8, 13-14).

Therefore, it is very important to study the hospitalization status and monitor the trend of patients' admission to the general ward and ICU during the COVID-19 epidemic. According to the results of this study, most patients with COVID-19 were admitted to the general ward, and the trend in the number of these patients was not constant during the 50 days from the onset of the epidemic. In the first 25 days, the number of daily hospitalizations in the general ward showed an upward trend, and in the second 25 days, this number showed an almost declining trend. Also, a smaller number of patients with COVID-19 were admitted to the ICU, and the number of daily hospitalizations in the ICU displayed an upward trend up to about 15 days after the onset of the epidemic. After that, the trend remained relatively stable. In the present study, during the 50 days from the onset of the COVID-19 epidemic, the number of patients admitted to the general ward decreased over time, but there was no significant reduction in the number of hospitalizations in the ICU.

In this study, although the percentage of patients admitted to public wards and the ICU fluctuated during the 50 days from the onset of the COVID-19 epidemic, on average, 76.94% of patients were hospitalized in the general ward and 23.06% in the ICU. Therefore, to equip a hospital for the treatment of COVID-19 patients, it is necessary to consider that approximately 77% of patients require hospitalization in the general ward and about 23% need ICU care.

Other studies have estimated that the percentage of hospitalized patients with COVID-19 in general wards and ICUs was about 80 to 85% and 15 to 20%, respectively, which is consistent with the findings of this study (10- 12). To date, in various studies on patients with COVID-19, the percentage of hospitalized patients in general wards and ICUs has not been considered constant during the pandemic (11-14). However, according to the results of this study, over time since the onset of the COVID-19 epidemic, the percentage of patients admitted to the general ward showed an almost decreasing trend, while the percentage of daily admissions to the ICU showed a practically increasing trend.

Conclusion

Finally, it should be noted that studying the hospitalization status of patients with COVID-19 can reveal the severity of the disease during the epidemic and help estimate the amount of medical equipment, supplies, medicines, and staff needed in hospitals. This can increase the efficiency of hospitals and medical centers in providing the best services to patients. The implications of this study extend beyond its immediate findings. It underscores the necessity of improving healthcare systems and data registries. By enhancing the capacity of healthcare systems to monitor and analyze hospitalization trends and patient outcomes, policymakers can better prepare for future public health emergencies. This study advocates for a comprehensive approach that integrates leadership, service delivery, and human resource management to optimize responses to biological epidemics.

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None declared by authors.

Author's Contributions

The authors confirm sole responsibility for the following: study conception and design, data collection, analysis and interpretation of results. All authors read and approved the final manuscript.

Data Availability

The raw data supporting the conclusions of this article are available from the authors upon reasonable request.

Conflict of Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Ethical Statement

This study protocol was reviewed and approved by Shahid Beheshti University of Medical Sciences, approval number IR.SBMU.NRITLD.REC.1399.176

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