

Investigating the Coronavirus Disease 2019 Process and its Related Occurrences during the Treatment Course

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INTRODUCTION

The coronavirus disease 2019 (COVID-19) is an acute respiratory infection caused by a new virus from the coronavirus family (1). By spreading in many countries across the world, this disease has led to the infection and death of millions of people (2). The most prevalent and severe manifestation of this disease is pneumonia, and this

Background: The disease process involves the occurrences happening during the disease and treatment course for the patient. Investigating this process is a significant and necessary issue for all diseases, including coronavirus disease 2019 (COVID-19).

Materials and Methods: Using the information of 4372 patients with COVID-19 referring to Dr. Masih Daneshvari Hospital in Tehran during the COVID-19 epidemic, being hospitalized, cared for, and home quarantined due to having mild symptoms, the COVID-19 process and its related occurrences were investigated during the treatment course.

Results: In the COVID-19 course, considering the disease severity, the likelihood of hospitalization in the general ward or the intensive care unit (ICU) ward, the likelihood of isolation or home quarantine, and the likelihood of occurrences such as recovery or death at the end of the disease course were taken into consideration. Based on the results of this study, the likelihood of hospitalization in the general ward, the ICU ward, and isolation or home quarantine was determined to be approximately 49.54%, 14.73%, and 35.73%, respectively. Also, for patients hospitalized in the general ward, the ICU ward, and isolated or home quarantined, the likelihood of recovery was estimated at approximately 64.79%, 10.82%, and 96.31%, respectively, and the likelihood of death was also estimated at about 35.21%, 89.18%, and 3.69% respectively.

Conclusion: Investigating the COVID-19 process and estimating the likelihood of incidence of its related occurrences during the treatment course both create an accurate prognosis and provide the possibility of achieving an efficient treatment for these patients.

Keywords: Coronavirus disease 2019; Disease process; Hospitalization status; Recovery; Mortality; Disease severity

group of patients will usually experience clinical symptoms five days after the onset of their disease (3-4). Cough, shortness of breath, muscle pain, sputum production, and sore throat are common and usual symptoms of this disease, and loss of sense of taste and smell are also its less prevalent symptoms (5). About 85% of patients with confirmed COVID-19 experience a mild to

moderate disease type, and almost 15% experience severe symptoms; in less than 6% of these patients, the disease becomes critical and dangerous (4, 6). No specific and efficient treatment has been provided for COVID-19 so far, and many facets of this disease have still remained mysterious and unknown (4, 7). A better understanding and recognition of any disease, including COVID-19, requires a detailed evaluation of the disease process (8-9). The disease process indeed includes the investigation and estimation of the probability of the occurrences happening during the disease and treatment course for the patient; thus, assessing the disease process for all diseases, both infectious and non-infectious, is a significant and necessary issue (10-11). With the spread of COVID-19 in countries across the world, one of the occurrences being considered by scholars and researchers during the disease period is death occurrence (12-14). Focusing studies and investigations merely on death occurrence will take the odds of studying the COVID-19 process away from researchers (7, 15,16) because focusing on death occurrence and not paying attention to other occurrences that may happen during the treatment course for patients with COVID-19, one cannot expect a correct understanding of the disease process and subsequently its treatment (17-18). When an individual is infected with COVID-19, besides death occurrence, various occurrences will happen to them during the disease and treatment course, and investigating these occurrences along with death occurrence is necessary to recognize the disease process. Investigating these occurrences and assessing the likelihood of their happening during the disease and treatment course underlie the COVID-19 process. Considering the disease severity, patients with COVID-19 will experience various occurrences, such as hospitalization in the general ward, in the intensive care unit (ICU) ward, and isolation or home quarantine during the disease and treatment course. Each patient will either finalize the disease with recovery or surrender to death occurrence at the end of the disease course. For getting a better understanding of this issue, the COVID-19 process and its related occurrences are displayed in Figure 1.

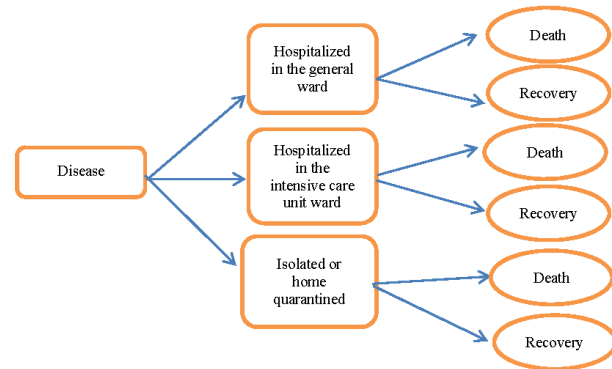


Figure 1. The coronavirus disease 2019 process and its related occurrences during the treatment course

In the COVID-19 process, according to the disease severity, the patients may be hospitalized in the general ward, the ICU ward, and isolated or home quarantined. Also, at the end of the disease course, recovery or death due to COVID-19 will be possible for each patient. Correct understanding and recognition of the COVID-19 mechanism and achieving a suitable prognosis for patients require a detailed assessment of the disease process and estimation of the possibility of happening occurrences such as hospitalization in the general ward and the ICU ward, isolation or home quarantine, as well as death and recovery occurrences at the end of the disease and treatment course.

MATERIALS AND METHODS

The information of 4372 patients with COVID-19 referred to Dr. Masih Daneshvari Hospital in Tehran during the COVID-19 epidemic, being hospitalized, or cared for, and home quarantined due to having mild symptoms to investigate the COVID-19 process and its related occurrences during the disease and treatment course. Based on this information, COVID-19-related occurrences were detected, and the possibility of happening occurrences was also estimated. In this study, given the disease severity and in order to investigate the COVID-19 process, occurrences such as hospitalization in the general ward, the ICU ward, and isolation or home

quarantine, as well as occurrences such as patients' recovery or death at the end of the disease and treatment course, were considered. STATA software version 14 was used for data analysis, and the significance level in this study was considered equal to 5%.

RESULTS

In this study, two categories of occurrences for patients were considered to investigate the COVID-19 process. The first category involved occurrences related to patients' disease severity or hospitalization status consisting of hospitalization in the general ward, the ICU ward, and isolation or home quarantine. The second category involved occurrences related to the end of the disease and treatment course, which were regarded as occurrences such as recovery or death. Using the information about patients with COVID-19, the likelihood of happening each of these occurrences was estimated based on the structure of the COVID-19 process in Figure 1. Based on the results of this study, given the disease severity, about 49.54% of patients were hospitalized in the general ward and 14.73% in the ICU ward of Dr. Masih Daneshvari Hospital in Tehran (Table 1). Also, almost 73.35% of the patients with milder clinical symptoms spent the disease course in isolation and home quarantine (Table 1). Based on these results, the maximum probability of hospitalization has been in the general ward and the minimum in the ICU ward. According to the results of this study, the maximum and minimum percentages of death due to COVID-19 were observed in patients hospitalized in the ICU and those isolated or home quarantined, respectively. Also, the maximum and minimum recovery percentages were related to isolated or home-quarantined patients and those hospitalized in the ICU ward, respectively. Based on the results of this study, the likelihood of recovery among patients hospitalized in the general ward, the ICU ward, and isolated or home quarantined was estimated at approximately 64.79%, 10.82%, and 96.31%, respectively. The possibility of mortality of patients hospitalized in the general ward, the ICU ward, and isolated or home

quarantined was also estimated at about 35.21%, 89.18%, and 3.69% (Table 1).

Table 1. Possibility of COVID-19 process and its related occurrences during the disease and treatment course

Occurrence	Estimated possibility (%)	95% confidence interval
Hospitalized in the general ward	49.54	48.74-50.33
Hospitalized in the intensive care unit	14.73	14.17-15.30
Isolated or home quarantined	35.73	34.97-36.50
Recovery in the general ward	64.79	63.70-65.87
Recovery in the intensive care unit	10.82	9.51-12.09
Recovery in Isolated or home quarantined	96.31	95.80-96.81
Death in the general ward	35.21	34.12-36.28
Death in the intensive care unit	89.18	88.52-91.04
Death in Isolated or home quarantined	3.69	3.19-4.20

DISCUSSION

Investigating the disease process is one of the most significant and necessary facets of all diseases (8,9). Without investigating the disease process, it is not possible to understand a disease mechanism correctly, and subsequently, one cannot expect proper control and treatment of the disease (10,11). Considering that COVID-19 is a newly emerging disease and many of its dimensions are still unknown, investigating the disease process is of special importance (4, 7). For a detailed study of the COVID-19 process, considering all occurrences that happen during patient treatment is essential (17,18). Focusing only on occurrences such as death and not paying attention to other occurrences related to this disease will culminate in an incomplete understanding of the COVID-19 process (7, 15,16). Lack of attention to other occurrences, particularly occurrences related to the COVID-19 severity and the hospitalization status of these patients, will obscure the understanding of scholars and researchers of this disease, on the one hand, and will take the possibility of getting an appropriate prognosis for patients and an efficient treatment for this disease away from the clinicians, on the other hand (7, 15,16). Numerous studies have investigated occurrences such as death due to and recovery from COVID-19 so far (12-14,19), so

numerous statistics about the possibility of death and recovery from this disease have been published in many countries (13,16,20). However, not taking into consideration occurrences such as COVID-19 severity has made it impossible to understand the disease process properly (7,15,16) because in order to understand the disease process properly, it is necessary to specify the probability of recovery and death of patients with COVID-19 by their disease severity and hospitalization status. Thus, using the information of patients with COVID-19 referred to and hospitalized in Dr. Masih Daneshvari Hospital in Tehran, the COVID-19 process and its related occurrences during the treatment course were investigated in this study. This research indicates that in addition to occurrences such as death and recovery considered for the end of the disease and treatment course in many studies, there are also other occurrences, such as the patients' hospitalization status, that can supplement the structure of the COVID-19 process. Based on the results of this study, although the maximum and minimum likelihood of hospitalization was related to the general ward and the ICU ward of the hospital, about 35.73% of the patients with mild symptoms were isolated and home quarantined. Considering the patients' hospitalization status in this study, approximately 27.85% (35.73+49.54) of patients have mild to moderate COVID-19 type, requiring hospitalization in the general ward or isolation and home quarantine, and only about 14.73% of patients need hospitalization in the ICU ward due to having severe and critical disease type. Based on the results of other studies, the present study results also approve that approximately 85% of patients will be affected with the mild to moderate COVID-19 type, and approximately 15% will be affected with the severe type of this disease (4, 6). One of the interesting points of this study is the probability of death and recovery of patients according to their hospitalization type. Based on the results of this study, about 89.18% of patients hospitalized in the ICU ward and about 35.21% of those hospitalized in the general ward die due to COVID-19, while the probability of death in isolated and home-

quarantined patients is only 3.69%. The possibility of recovery in isolated and home-quarantined patients and in those hospitalized in the general ward of the hospital also is about 96.31% and 64.79%, respectively, while this possibility is very low, about 10.82%, for patients hospitalized in the ICU ward.

Based on the results of this study, the minimum odds of the patients' survival belong to the ICU ward, and the maximum belongs to isolation and home quarantine. Unlike many studies that have assessed the COVID-19 process without considering the hospitalization type and the disease severity (7,16,20), in this study, besides estimating the likelihood of hospitalization of patients in the general ward, the ICU ward and isolation or home quarantine, the likelihood of patients' recovery and mortality has also been provided to clinical scholars and researchers separately by the hospitalization type and the disease severity. Therefore, the results of this study can play a critical role in the prognosis and treatment of patients with COVID-19.

CONCLUSION

In conclusion, it is worth mentioning that investigating the COVID-19 process and estimating the likelihood of COVID-19-related occurrences during the treatment course will promote the researchers' understanding and recognition of this mysterious disease and allow the possibility of accessing more efficient treatment methods for this disease.

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