Nursing Care in Patients with COVID-19: A Proposed Algorithm

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Abstract

Objective: Since coronavirus disease 2019 affected the whole world in such a short time, it has many unknown aspects. These unknown, scary, and deadly aspects have put people, including healthcare workers, in panic. The objective of the study is to create a new care and treatment algorithm to facilitate and manage the nursing care practices in line with the physiological and psychosocial needs of patients diagnosed with coronavirus disease 2019.

Methods: This study was carried out by filtering from the information obtained from 135 patients whose follow-up and care were the responsibility of the authors. The findings and demographic information essential to the study were collected by the authors.

Results: The approaches developed and applied by the authors were handled analytically, and algorithms were created for patients diagnosed with coronavirus disease 2019.

Conclusion: The proposed algorithms can serve as a guide for clinics and nurses who are new to the field or have no experience in taking care of these patients.

Keywords: Nursing practice, care protocol, coronavirus disease 2019

Introduction

In December 2019, a novel acute respiratory disease called coronavirus disease 2019 (COVID-19) emerged from the city of Wuhan, China, and spread rapidly around the world to a high number of countries in just a few months, creating a pandemic with an almost matchless pattern of high levels of infectivity and mortality observed in the past century.[1] This relatively new disease created many uncertainties because of its rapid emergence without any collective experience neither in our country nor around the world.[2] The frightening, deathly, and unknown nature of the virus created panic, anxiety, and fear among the population, including the healthcare workers. Despite the initial shock, in a short time period, healthcare workers' scientific approach to the problems caused by the disease began producing solutions.

In addition to the way of spread, incubation period, symptoms, and treatment modalities, COVID-19 also necessitated revisions on the preventive measures that should be taken while following the pandemic algorithms. Despite the local variations and differences in coverage, scientific committees of all levels proposed similar action plans and provided guidance to the decision-makers about the different aspects of the pandemic. Various divisions of the healthcare institutions reported their experiences with proposals for prevention and action. Each evaluated the condition from its perspective to come up with a road map which was all combined to produce extensive algorithms. An inseparable part of the patient care during the pandemic, nursing care and practice, played an integral part during this experience, and various suggestions were made for the fields of the pandemic where the current experience remained insufficient. Recently gained experiences, experienced problems, and proposed solutions led us create this study.

Nearly 80% of the patients with COVID-19 experience mild symptoms that last only 14 days, but the other 20% suffer from more severe conditions such as acute respiratory failure, acute respiratory distress syndrome, and shock.[3] World Health Organization, Centers for Disease Control and Prevention, and other health organizations around the world created various algorithms and manuals for the non-critically ill patients regarding the infection control and diagnostic approach.[4] These manuals provide the ideal practice proposals for the management of the clinical decision-making processes. Unfortunately, ideal preventive and therapeutic pathways during the fight against COVID-19 are still to be discovered.

In order to standardize the decision-making processes during the patient care, reports of experience gained by each and every healthcare institution are required so that more solid steps can be taken during patient care and treatment.[5] A novel treatment and care algorithm for the patients with COVID-19 was proposed after revising the standard ones for easier nursing care and practice and management.[6] The aim of the study is to create a new care and treatment algorithm to facilitate and manage the nursing care

practices in line with the physiological and psychosocial needs of patients diagnosed with COVID-19.

Methods

The study was conducted between March 21 and June 15, 2020, after the approval of the İstanbul University-Cerrahpaşa Ethics Committee (April, 2020, No: 58170629-604.01.01-52916) and Ministry of Health in accordance with the Declaration of Helsinki. All participants were given and signed an informed consent form.

Sample Population

A total of 3809 patients were admitted to our institution, with 1136 hospitalizations. Nine hundred seventy-two patients were treated in wards, while 164 were treated in intensive care units. The criteria for hospitalization were proposed by the institution's own scientific committee founded for COVID-19. Randomly selected 135 patients were included in this study. Random selection was based on the patients who were admitted during the shift of the authors. Patients' consent was obtained prior to admission to our wards, and pregnant patients, patients without the ability to give consent, and patients with psychiatric comorbidities were excluded.

Data Collection

The study was performed on 135 patients who were taken care of by the authors. The authors individually gathered information during admission. The data were collected with the standardized COVID-19 Patient Medical History Questionnaire (Supplementary

Table 1. Demographic Information Regarding the Patients Included in the Study

Characteristics		Patients	%
Sex	Male	73	54.07
	Female	62	45.93
Age		55.94 (20-94)	
Diagnosis	PCR (+)	85	62.96
	CT (+)	107	79.26
Comorbidity	Hypertension	51	37.78
	Diabetes mellitus	29	21.48
	Heart failure	18	13.33
	Asthma	9	6.67
	Chronic kidney failure	8	5.93
	Chronic obstructive pulmonary disease	6	4.44
Transfer to intensive care unit		16	11.85
Mortality		7	5.19

CT, computed tomography; PCR, polymerase chain reaction.
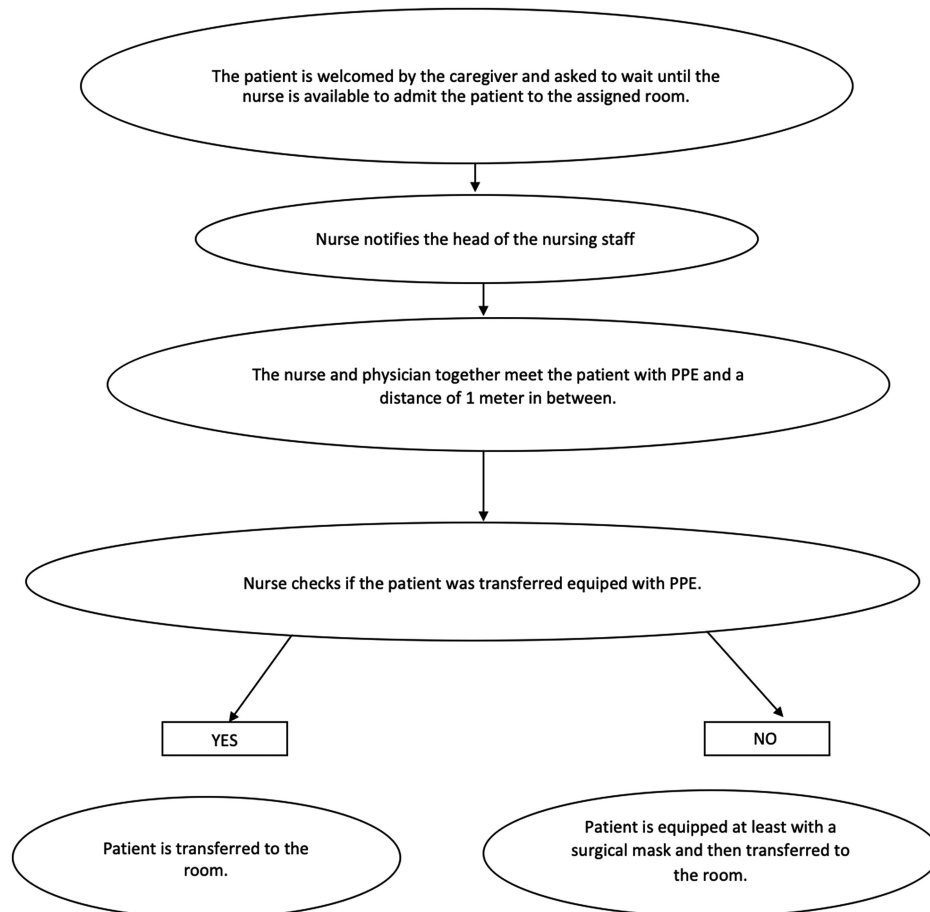

Figure 1. Admission algorithm for patients hospitalized from the pandemic outpatient clinic or emergency department. PPE, personal protective equipment.

Material 1), created by the authors based on the Activities of Daily Living Model. Based on this questionnaire, another COVID-19 Nursing Care Form (Supplementary Material 2) was created because the standard Nursing Care Form had insufficient aspects for the care of COVID-19 patients. Because this second form was created later in the study, it could be only filled for the last 35 patients of the study, and it was not filled retrospectively for the previously admitted patients.

The patients were followed 4 times a day using the COVID-19 Nursing Care Form.[7] The nursing diagnosis was considered according to the negative/positive aspects of patients' functional status, risk factors, and dependence and independence in daily activities.[3] The patients were grouped according to the urgency of their conditions in accordance with the internationally used NANDA International nursing diagnosis system.[8] Interventions against these grouped problems were planned individually by updating the COVID-19 Nursing Care Form on a daily basis to take preventive measures against any deathly or urgent consequence.

Necessary interventions were planned to help the patients with their decreased level of function in their daily activities due to the effect of the disease, severity of symptoms, and isolation, including protection of the patient, reassurance, and application of the planned treatment.[9] All interventions and evaluations were recorded in the COVID-19 Nursing Care Form. In the 90 days of the study duration, 135 patients were taken care of on a shift-based working schedule. Two nurses were assigned to each ward to take care of the patients during their shifts lasting no longer than 12 hours.

Results

A total of 135 patients, 73 males and 62 females, were included in our study (Table 1). The mean age of the patients was 55.94, with the youngest being 20 and the oldest being 94 years old. Four of the patients were healthcare workers—2 doctors and 2 nurses. The treatment of 128 patients was completed in our wards, whereas 16 patients required transfer to
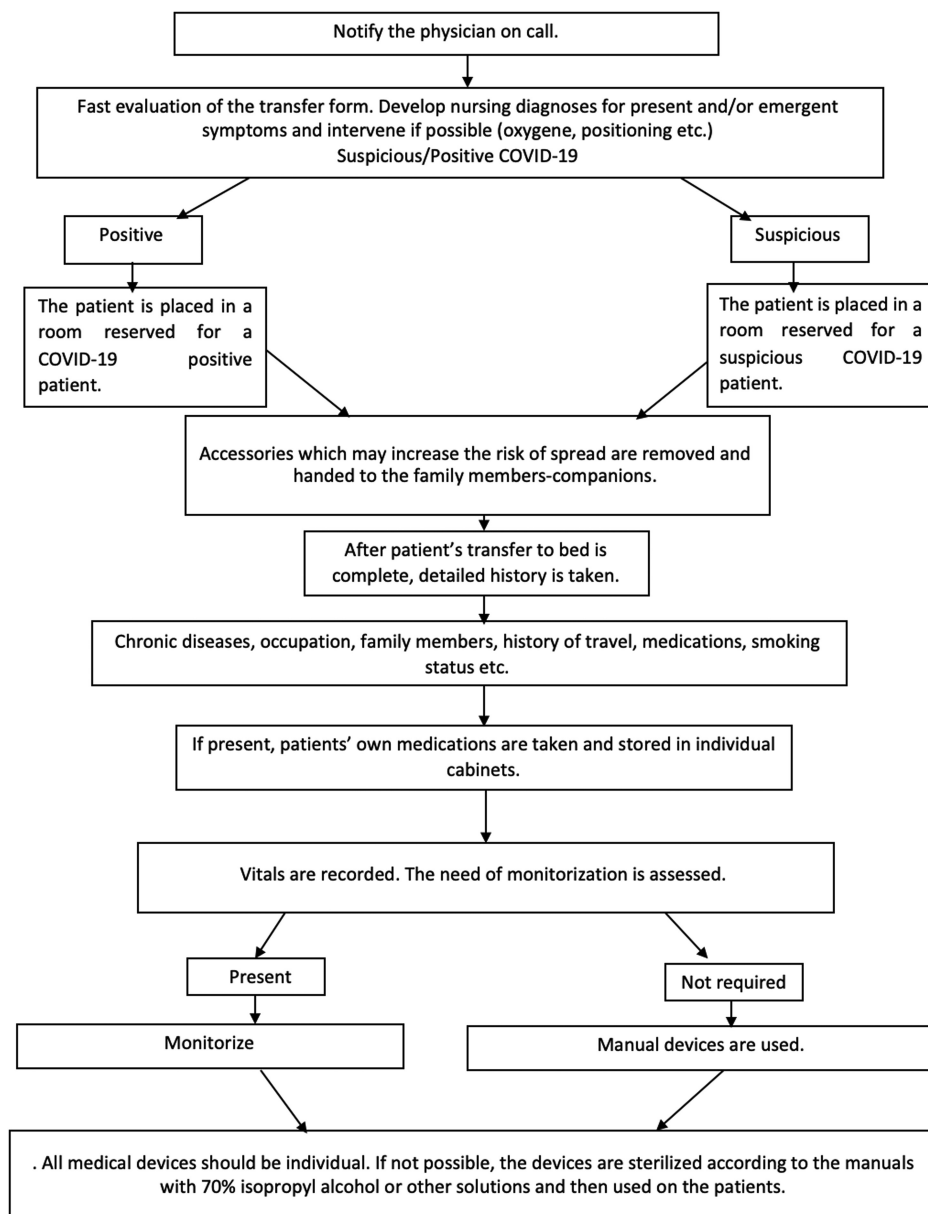

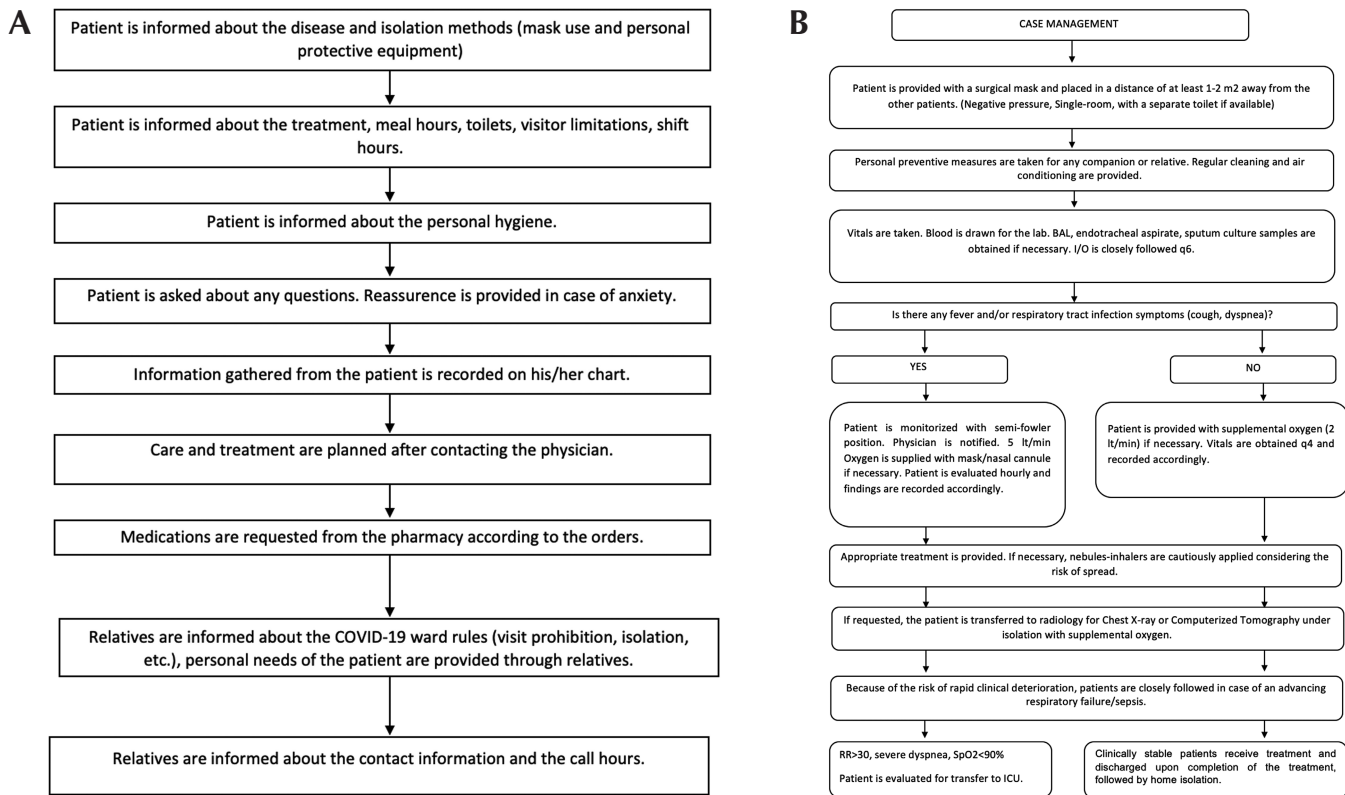**Figure 2.** Algorithm for transfer to the bed.

A

Patient is informed about the disease and isolation methods (mask use and personal protective equipment)

↓

Patient is informed about the treatment, meal hours, toilets, visitor limitations, shift hours.

↓

Patient is informed about the personal hygiene.

↓

Patient is asked about any questions. Reassurence is provided in case of anxiety.

↓

Information gathered from the patient is recorded on his/her chart.

↓

Care and treatment are planned after contacting the physician.

↓

Medications are requested from the pharmacy according to the orders.

↓

Relatives are informed about the COVID-19 ward rules (visit prohibition, isolation, etc.), personal needs of the patient are provided through relatives.

↓

Relatives are informed about the contact information and the call hours.

B

CASE MANAGEMENT

↓

Patient is provided with a surgical mask and placed in a distance of at least 1-2 m2 away from the other patients. (Negative pressure, Single-room, with a separate toilet if available)

↓

Personal preventive measures are taken for any companion or relative. Regular cleaning and air conditioning are provided.

↓

Vitals are taken. Blood is drawn for the lab. BAL, endotracheal aspirate, sputum culture samples are obtained if necessary. I/O is closely followed q6.

↓

Is there any fever and/or respiratory tract infection symptoms (cough, dyspnea)?

YES / **NO**

YES: Patient is monitorized with semi-fowler position. Physician is notified. 5 lt/min Oxygen is supplied with mask/nasal cannule if necessary. Patient is evaluated hourly and findings are recorded accordingly.

NO: Patient is provided with supplemental oxygen (2 lt/min) if necessary. Vitals are obtained q4 and recorded accordingly.

↓

Appropriate treatment is provided. If necessary, nebules-inhalers are cautiously applied considering the risk of spread.

↓

If requested, the patient is transferred to radiology for Chest X-ray or Computerized Tomography under isolation with supplemental oxygen.

↓

Because of the risk of rapid clinical deterioration, patients are closely followed in case of an advancing respiratory failure/sepsis.

RR>30, severe dyspnea, SpO2<90%
Patient is evaluated for transfer to ICU.

Clinically stable patients receive treatment and discharged upon completion of the treatment, followed by home isolation.

Figure 3. A,B. A. Algorithm for patient informing. **B.** Case management algorithm.

the intensive care unit. The minimum duration of hospital stay for a patient was 5 days and the maximum was 28 days. Seven patients died during the study period. The reason for death for all patients was an exacerbation of a previously known comorbidity. Cytokine storm was not observed during the patients' stay at our wards. This clinical scenario was recognized after the patients' clinical deterioration and their transfer to intensive care units.

Three patients did not have polymerase chain reaction (PCR) results. For 85 patients, the PCR results were positive and for the remaining 107 patients, PCR results were negative; however, the patients had positive findings for COVID-19 on chest computerized tomography. Three patients had contact with a previously diagnosed COVID-19 patient. Comorbidities included heart failure in 18, hypertension in 51, diabetes mellitus in 29, asthma in 9, chronic obstructive pulmonary disease in 6, chronic renal failure in 8, thyroid disease in 2, urothelial cancer in 1, cirrhosis in 1, rheumatoid arthritis in 1, gout in 1, leukemia in 1, multiple sclerosis in 1, myasthenia gravis in 1, Behcet's disease in 1, Takayasu's arthritis in 1, pulmonary nodule in 1, tuberculosis in 1, fibromyalgia in 1, and Down syndrome in 1 patient. Eighty-nine patients required supplemental oxygen at one point during their stay in our wards. One patient required hemodialysis. Symptoms such as cough, high fever, fatigue, loss of appetite, sore throat, dizziness, sweating, and hoarseness were observed in 59, 31, 38, 9, 3, 2, 4, and 1 patients, respectively. Thirteen patients reported loss of sense of smell and 13 patients reported loss of sense of taste. Six patients suffered from diarrhea, and all were PCR positive. In 33 patients, C-reactive protein levels were under 5 mg/L, and in 14, 26, 24 and 14 of the patients, these levels were between 5 and 20 mg/L, 50 and 100 mg/L, 100 and 200 mg/L, and 200 and 300 mg/L, respectively. In only 8 patients, CRP levels were over 300 mg/L. Sixteen patients were functionally disabled, and they were closely followed up with a more intensive nursing care. For 10 patients, a family member or a non-family member companion was needed and allowed.

In order to provide timely clinical interventions under stressful circumstances in the future, considering our experience, we evaluated our approaches to the patients with COVID-19 algorithmically and created new algorithms for the admission (Figure 1), transfer to bed (Figure 2), patient informing (Figure 3), and case management (Figure 4) of such patients. A final nursing care and treatment algorithm was developed using the previous ones for only the patients with COVID-19, who were admitted to the wards, thereby excluding the intensive care, operating rooms, and outpatient clinics.

Discussion

Since history, healthcare workers have been combining their specialties to come up with the most efficient and optimal interventions to provide the best outcomes for the patients. New diseases require evidence-based approach from various fields of medicine to come up with these solutions. In addition to the ongoing clinical therapeutic studies on COVID-19, standards on the care should be determined for the patients who already suffer from the disease.[10] We performed this study as a future guide for our colleagues to provide the best care and supportive treatment to the patients and to improve nursing care and practice for COVID-19 patients.

The critical changes made in this protocol include saturation, respiratory rate and depth, and effort capacity monitoring in addition to the routine follow-up parameters. Moreover, changes in the sense of smell and taste were recorded as well. Changes in circulatory function for microthrombi and skin lesions such as urticaria were inspected. Patients were also asked for the presence of diarrhea.

Patients diagnosed with COVID-19 were observed to require an increased need of care and a more frequent need of emergency interventions. Because of the risk of spread, the patients are followed under respiratory and contact isolation. Spread risk was present for both companions and healthcare workers, which should be addressed as an important problem. The risk for the companions can be minimized by not allowing them in the patient rooms if the patient's condition allows, but the risk for the healthcare workers can only be decreased for a limited extent. One of the conductors of the study showed symptoms of COVID-19 25 days after the date of first admission and tested positive on day 35. This nurse was hospitalized in our institution, treated accordingly, and discharged after the second negative PCR result. After 14 days of home isolation, she was able to come back to her work environment. This experience of hers caused stronger empathy in her practice.

Since no visitors or companions were allowed unless needed, the supports were provided by the nurses and the caregivers. However, because patient visits were limited to 15 minutes for the healthcare workers, the nursing care also suffered from some setbacks. Therefore, the need of a standard protocol arose to use this time more efficiently. Because of the experience that we gained at our wards, the manuals of the medical devices that we regularly use at our service were revised. Manual or electronic blood pressure monitors, especially the cuffs, were used solely for 1 patient. The same rule applied for the saturation probes as well. The use of these devices on different patients required sterilization each and every time, which resulted in device malfunction and time consumption. Therefore, each patient was provided with an individual saturation probe and blood pressure cuff. Contactless thermometer devices were appreciated even more during the pandemic period and used regularly as well. Since the future of the pandemic is still unknown, we advocate the use of such contactless devices while monitoring patients, who may be asymptomatic or be falsely tested negative for COVID-19.

In the fight against this recent pandemic, we believe that standardized approach to the disease would decrease the anxiety among the healthcare professionals and provide a more professional approach to the patients. The algorithm that we provided can be efficiently used by our colleagues and the clinics that have insufficient levels of experience in care of patients with COVID-19.

The proposed algorithms can serve as a guide for clinics and nurses who are new to the field or have no experience in taking care of these patients.

References

1. Akyar İ. Nursing care of demented patient and care models. *Hacettepe Univ Fac Health Sci Nurs J.* 2011;18(2):79-88.
2. Dane E, Yalın H, Olgun N. Erişkin Still hastalığı ve hemşirelik bakımı: olgu sunumu. *Med J Bakirkoy.* 2018;14(1):120-128.
3. Huh S. How to train the health personnel for protecting themselves from novel coronavirus (COVID-19) infection during their patient or suspected case care. *J Educ Eval Health Prof.* 2020;17:10. [CrossRef]
4. Joseph T, Moslehi MA. *International Pulmologists Consensus on COVID19;* 2020. Available at: https://www.unah.edu.hn/dmsdocument/9674-consenso-internacional-de-neumologos-sobre-covid-19-version-ingles.
5. Liu Y, Yan LM, Wan L, et al. Viral dynamics in mild and severe cases of COVID-19. *Lancet Infect Dis.* 2020;20(6):656-657. [CrossRef]
6. Purkuloğlu E, Arzu Ü, Yürürdurmaz F. Hemşire karar destek sistemleri Uygulamalari. *Hacettepe Sağlık İdaresi Derg.* 2019;22(3):491-514.
7. Terzi B, Kaya N. Yoğun bakım hastasında hemşirelik bakımı. *Yoğun Bakım Derg.* 2011;1:21-25.
8. Terzioğlu F, Apay SE, Akkuş Y, et al. Travmali hasta vakalarinda öğrenci hemşirelerin hemşirelik tanilarini ve girişimlerini belirleyebilme durumlari. *Anadolu Hemşirelik Sağlık Bilimleri Derg.* 2012;15(2):106-118.
9. Uysal H. Akut solunum yetersizliği ve hemşirelik bakımı. *Nurs.* 2010;1(1):13-18. [CrossRef]
10. World Health Organization (WHO). 2020. *Considerations for quarantine of individuals in the context of containment for coronavirus disease (COVID-19): Interim Guidance.* World Health Organization. Available at: https://apps.who.int/iris/handle/10665/331299