

**ORIGINAL RESEARCH:  
EMPIRICAL RESEARCH - QUANTITATIVE**

# Nursing care management based on the Omaha system for inpatients diagnosed with COVID-19: An electronic health record study

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**Abstract**

**Aims:** The aim of this study was to identify the clinical characteristics of patients diagnosed with COVID-19 and the existing nursing problems based on the Omaha System, and to establish a comprehensive nursing care management plan by determining the nursing interventions and care outcomes.

**Design:** This study used a descriptive cross-sectional design.

**Methods:** This study was conducted in a training and research hospital with 25 non-intubated COVID-19 inpatients between 6 April and 13 May 2020 in Turkey. Data were collected using a Socio-demographic and Clinical Characteristics Form, the COVID-19 Response Separate Guidelines and the Omaha System and Nightingale Notes software. Data were analysed using descriptive statistical tests and the chi-square method.

**Results:** Using the Omaha System, it was shown that the patients' most common problems were communicable/infectious condition, respiration, circulation, pain, nutrition, personal care and substance use respectively. The most common signs and symptoms were signs of infection, fever, cough, respiratory distress and pain. The interventions that were performed most frequently to the patients included infection precautions, medication action/side effects, signs/symptoms-physical, dietary management and nursing care targets for intervention. These interventions were applied using the category of teaching, guidance and counselling. A significant improvement was observed in the patients' pre- and post-intervention knowledge, behaviour and status scores.

**Conclusions:** The results showed that the Omaha System provided effective guidelines for diagnosing the problems, planning and implementing appropriate interventions for the COVID-19 patients. Therefore, it is recommended to use the Omaha System in nursing care of COVID-19 patients.

**Impact:** This is the first study to identify the nursing problems of COVID-19 patients and to evaluate the outcomes of nursing interventions and care using an international taxonomy along with electronic health record software. The findings of this study can provide evidence-based guidelines addressing the nursing problems, interventions and outcomes of COVID-19 patients.

**KEYWORDS**

coronavirus, COVID-19, electronic health record, nursing, pandemic, the Omaha System

## 1 | INTRODUCTION

On 31 December 2019, the World Health Organization (WHO) China Country Office reported pneumonia cases of unknown aetiology in Wuhan, Hubei Province, China. On 7 January 2020, the causative agent was identified as a new coronavirus (2019-nCoV) that had not previously been detected in humans, and the disease was named COVID-19. According to WHO, the disease spectrum caused by coronavirus in humans can range from simple colds to acute respiratory distress syndrome (ARDS). In addition, the virus can cause clinical manifestations in humans and animals with various degrees of respiratory, enteric, hepatic, nephrotic and neurological involvement. WHO reported that the COVID-19 virus affects humans in different ways, and that most infected people show mild-to-moderate symptoms and recover without requiring special treatment/hospitalization (WHO, 2020).

Research on COVID-19 shows that the disease is severe in people who have severe chronic diseases such as hypertension, ischemic heart disease, diabetes mellitus, chronic obstructive pulmonary disease (COPD) or cancer and people who are over the age of 60 years, and these individuals have a higher risk of death. In addition, studies have reported that common symptoms of the disease are fever, fatigue, dry cough, as well as symptoms of shortness of breath, headache and general body ache (Borges do Nascimento et al., 2020; Kato et al., 2020). According to Centers for Disease Control and Prevention (CDC), frequently reported symptoms also include loss of taste and smell, diarrhoea and nausea (CDC, 2020).

## 2 | BACKGROUND

On 11 March 2020, Turkish Ministry of Health reported the first COVID-19 case detected in the country and, on the same day, WHO declared COVID-19 outbreak a global pandemic. The number of cases and deaths, which decreased on 24 April 2020, started to rise again as of September 2020. According to the data announced by Turkish Ministry of Health, a total of 17,901,868 tests were performed between March 11 and December 12, 2020, the number of COVID-19 cases was 1,809,809, the total number of deaths due to COVID-19 was 16,199 and the total number of cases recovered was 1,585,565. The Ministry provided the rate of pneumonia diagnosis in COVID-19 patients beginning from 29 July 2020. Accordingly, the incidence of pneumonia in the cases confirmed between 29 July and 12 December 2020 varied between 9.4 and 3.1, and the average rate was  $5.82 \pm 1.76$  (Ministry of Health of Turkey, 2020).

According to data from the Ministry of Health, Istanbul is both the first Turkish city where a COVID-19 case was confirmed and the city with the highest rate of confirmed COVID-19 cases and deaths in Turkey (Ministry of Health of Turkey, 2020). Prior to the first confirmed case in Turkey, the Coronavirus Scientific Advisory Board was established under the authority of the Ministry of Health to combat COVID-19. After the virus was first detected in Turkey, the board also published the COVID-19 Guidelines as a part of actions carried

out regarding the diagnosis, prevention, control and treatment of the disease, and the guidelines were updated at certain periods (Ministry of Health of Turkey, 2020). Clinicians around the world have been working collaboratively on the treatment of COVID-19 patients. Using the teleconference method, they have been striving to find the fastest and most successful methods by sharing the treatments they have used. Among these people, Monsen et al. (2020), Omaha System developers, have been conducting research on patient care and nursing. So far, they have organized webinars to ensure the use of the Omaha System to prevent COVID-19 disease and to support control activities and documentation at the individual, family and community level, and they have developed evidence-based guidelines based on the Communicable/infectious condition problem for use in patient care (Monsen, 2020; Monsen et al., 2020). In Turkey, on 21 April 2020, Turkish Nurses Association (TNA) published the COVID-19 Nurse Training Guide and Care Algorithms Guide (TNA, 2020). The guide encompasses detailed and crucial information about infection control, care and follow-up of COVID-19 patients, and use of protective equipment, but it does not include a problem-oriented care plan approach. In addition, there are currently not any other published studies conducted by nurse researchers on the problems, care interventions and outcomes of COVID-19 patients. This situation could be considered as an indication of the need for this study.

### 2.1 | The Omaha system

The Omaha System was developed by the Visiting Nurse Association of Omaha and it has been used in many countries around the world not only by nurses but also by physicians, dieticians, pharmacists, community health workers, social workers, physiotherapists and other health workers. The Omaha System consists of three main components: the Problem Classification Scheme, the Intervention Scheme and the Problem Rating Scale for Outcomes. The Problem Classification Scheme includes 42 problems and 335 symptoms and signs in four domains: environmental, psychosocial, physiological and health-related behaviour domains. It enables to diagnose the problems of individuals, families and communities at actual, potential and health promotion levels. The Intervention Scheme consists of four categories: treatments and procedures; teaching, guidance and counselling; case management; and surveillance in addition to 76 targets for intervention. The Problem Rating Scale for Outcomes consists of five-point Likert-type scales to measure the impact of interventions on the diagnosed problems for the individual, family or community. The progress made by the individual, family or community for the concepts of 'knowledge', 'behaviour' and 'status' is measured on a scale from 1 to 5 through pre- and post-intervention assessments. Thus, the efficacy of interventions is measured (Erdogan et al., 2016; Martin, 2005). The Omaha System has been used in various areas, such as home care, community health, school health, occupational health, transitional care, rehabilitation care, palliative care, acute care, nursing education and research (Aylaz et al., 2010; Gur et al., 2008; Isci & Esin, 2009; Ornek & Ardıc, 2019; Kulakci & Nuran, 2011).

### 3 | STUDY

#### 3.1 | Aims

The aim of this study is to identify the clinical characteristics of patients diagnosed with COVID-19 and the existing nursing problems based on the Omaha System, and to determine the nursing interventions and care outcomes. Therefore, a comprehensive nursing care management plan for COVID-19 patients could be established. By using Nightingale Notes EHR software (Champ Software), the study also aims to identify other health problems of COVID-19 patients apart from communicable/infectious condition, fever and pneumonia, the nursing interventions and care outcomes by means of an EHR study.

#### 3.2 | Design

This study used a descriptive cross-sectional design.

#### 3.3 | Sample

The sample consisted of 25 non-intubated COVID-19 patients who were treated in a pandemic unit in Istanbul between 6 April and 13 May 2020.

#### 3.4 | Data collections

The study was conducted in Istanbul, the city with the highest rate of confirmed COVID-19 cases and deaths in Turkey. The sampling process was carried out in one of the pandemic units of a training and research hospital of a university in Istanbul. The pandemic unit was opened on 1 April 2020, and the researcher (a registered nurse with 5 years of clinical experience) provided treatment and care to COVID-19 patients in this unit between 6 April and 13 May 2020. The nurse researcher, who provided treatment and care to COVID-19 patients, simultaneously kept a record of the patients' data in Nightingale Notes. Based on the Omaha System, the researcher diagnosed the patients' problems using the Problem Classification Scheme, developed and implemented care plans using the Intervention Scheme and assessed the intervention outcomes using the Problem Rating Scale for Outcomes.

#### 3.5 | Measures

Data were collected using a Socio-demographic and Clinical Characteristics Form, the COVID-19 Response Separate Guidelines (Monsen et al., 2020), and Nightingale Notes software (Champ Software).

#### 3.5.1 | Socio-demographic and clinical characteristics form

The socio-demographic part of the form included questions about the patients' age, gender, educational status, employment status and professional status while the clinical characteristics part included questions about the patients' previous chronic disease diagnoses, medications used continuously, vital signs, laboratory results, total duration of hospitalization, smoking-alcohol-substance use, hospitalization status for the past year and surgery history for the past year.

#### 3.5.2 | COVID-19 response separate guidelines

Monsen et al. (2020) developed the COVID-19 Response Separate Guidelines-the Omaha System to provide nurses who care for COVID-19 patients with evidence-based guidelines in creating a care plan. Based on the communicable/infectious condition problem, the guidelines present targets and intervention recommendations specific to COVID-19 diagnosis and can be downloaded to mobile phones as an application. By using the guidelines and selecting the targets and interventions for the communicable/infectious condition problem, data were processed in Nightingale Notes software (Monsen, 2020; Monsen et al., 2020).

#### 3.5.3 | Nightingale notes software

Nightingale Notes was developed by Champ Software as an electronic recording and reporting system based on the terminology of the Omaha System to document nursing practices and create a guide for nursing practices. Nightingale Notes software consists of two sections. The first section records the demographic and health information of patients. The second section consists of three components of the Omaha System: the Problem Classification Scheme, the Problem Rating Scale and the Intervention Scheme. Data reports from Nightingale Notes can be generated in PDF, Excel or graphic formats and can be imported into statistical software.

#### 3.6 | Data analysis

After the patients' Socio-demographic and Clinical Characteristics were processed in Nightingale Notes (Champ Software), by using the Omaha System components of the software, each patient's care plan was determined according to the Omaha System and recorded in the system. Data were exported in Microsoft Excel (Microsoft, Redmond, WA) format and imported into SPSS 21 (IBM Corporation, Armonk, NY) statistical software for analysis. Descriptive statistics were used to summarize the demographic data and outcome variables, and the chi-square test was used for comparative analysis. Data were visualized using the 'Matrix visualization' graphics as shown in Figure 1. The problems are shown on the y-axis and the targets are shown on the x-axis, including all categories represented by

colour. There is also shading that shows the number of interventions. The colour shade gets darker as the number of interventions increases.

### 3.7 | Validity and reliability

The validity and reliability of the Omaha System for use in Turkish were tested by Erdogan and Esin (2006). The  $\kappa$  values of the problems, categories and targets were found to vary between 0.72 and 0.83 (Erdogan & Esin, 2006).

### 3.8 | Ethical consideration

Ethical permission was granted by the Ethics Committee for Non-Interventional Research of Istanbul University-Cerrahpasa (74555795-050.01.04-) and institutional permission was granted by Turkish Ministry of Health COVID-19 Scientific Research Platform (Ardic-2020-05-01T22\_12\_09.xml). In addition, all the patients who agreed to participate in the study were asked to sign a Volunteer Consent Form and an Informed Consent Form, and their verbal and written consent was obtained.

## 4 | RESULTS

### 4.1 | Socio-demographic and clinical characteristics of COVID-19 patients

The patients were between 37 and 85 years of age, and their mean age was  $60.48 \pm 13.19$ . Among the patients, 16 (64%) were male and

17 (68%) were married. The most common chronic disease in the patients was diabetes mellitus (40%;  $n = 10$ ), followed by hypertension (36%;  $n = 9$ ), but 11 patients (44%) did not have any chronic diseases. Also, three patients were smokers and consumed alcohol. The patients' duration of stay in the unit ranged from 5 to 20 days, with the average being  $8.76 \pm 3.96$ . One of the patients died, but the others recovered and were discharged without the need for intensive care. The patients' clinical characteristics are shown in Table 1. During their stay in the unit, the patients' average body temperature was  $37.13 \pm 0.79^\circ\text{C}$ , the average pulse rate was  $94.13 \pm 14.96/\text{min}$ , the average respiratory rate was  $17.54 \pm 2.94/\text{min}$ , the average systolic blood pressure was  $142.84 \pm 19.01 \text{ mmHg}$ , the average diastolic blood pressure was  $84.79 \pm 11.47 \text{ mmHg}$  and the average body mass index (BMI) was  $28.47 \pm 5.55$ . Among the patients, 33.5% were overweight and 42.2% were obese. According to the results of the blood test performed on the day they were admitted to the hospital, the patients' D-dimer was  $761.05 \pm 447.15 \text{ ng/mL}$  (range = 160 to 2010), activated partial thromboplastin time (aPTT) was  $30.21 \pm 4.33$  (range = 21.80 to 39), partial thromboplastin time (PTT) was  $14.63 \pm 1.96$  (range = 10.60 to 19.10), blood glucose level was  $180 \pm 113.26 \text{ mg/dL}$  (range = 90 to 501), and c-reactive protein (CRP) was  $5.01 \pm 5.40 \text{ mg/dL}$  (range = 0.20 to 18.90). Also, all the patients had signs of pneumonia in their x-ray results. For their treatment the patients received Favipiravir 200 mg ( $2 \times 1600 \text{ mg}$  on Day 1,  $2 \times 600 \text{ mg}$  on Day 2, and  $2 \times 200 \text{ mg}$  as maintenance dose), Oseltamivir 75 mg ( $1 \times 75 \text{ mg}$ ), Hydroxychloroquine Sulphate 200 mg ( $2 \times 400 \text{ mg}$  on Day 1 and  $2 \times 200 \text{ mg}$  maintenance dose), Azithromycin 250 mg ( $1 \times 500 \text{ mg}$  on Day 1 and  $1 \times 250 \text{ mg}$  as maintenance dose) orally. In addition, the patients received Enoxaparin sodium  $1 \times 0.6 \text{ mg}$  subcutaneously and Ceftriaxone  $1 \times 2 \text{ gr}$  intravenously.

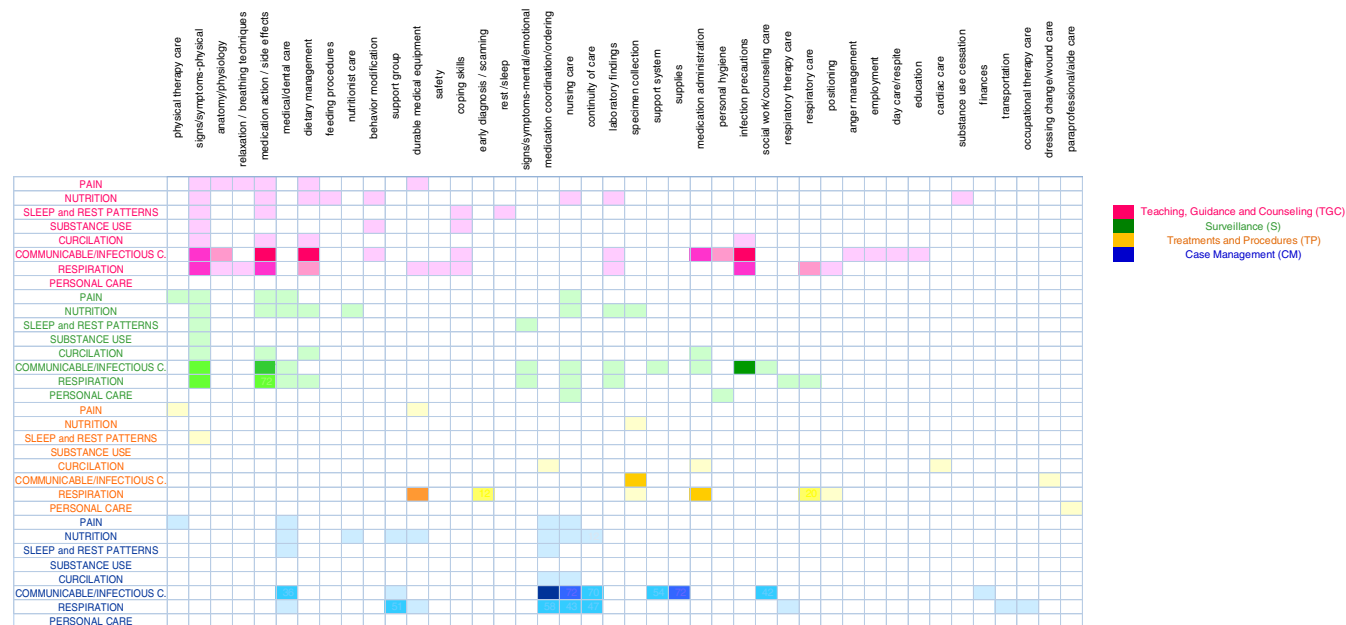


FIGURE 1 The matrix visualization for eight problems and interventions of COVID-19 inpatients. The problems are shown on the y axis, including all categories represented by color, targets shown on the x axis. Shading indicates number of interventions (darker = more) [Colour figure can be viewed at [wileyonlinelibrary.com](http://wileyonlinelibrary.com)]

**TABLE 1** Socio-demographic and Clinical Characteristics of patients diagnosed with COVID-19 (N = 25)

Characteristics	Min	Max	Mean	SD
Age (year)	37	85	60.48	13.19
Hospitalization (days)	5	20	8.76	3.96
Body temperature (°C)	36	38.6	37.13	0.79
Heart rate	70	120	94.13	14.96
Systolic blood pressure (mmHg)	101	171	142.84	19.01
Diastolic blood pressure (mmHg)	62	110	84.79	11.47
Respiratory rate	14	25	17.54	2.94
			n	%
<b>Gender</b>				
Male			16	64
Female			9	36
<b>Marital status</b>				
Married			17	68
Single			8	32
<b>Chronic diseases</b>				
Diabetes			10	40
Hypertension			9	36
Cardiovascular disease			2	8
Malignancy			1	4
Chronic renal disease			2	8
Asthma			1	4
COPD			1	4
<b>Body Mass Index</b>				
Underweight (<18.5)			1	4
Normal weight (18.5–24.9)			5	20
Overweight (25–29.9)			8	32
Obesity (30 or greater)			11	44
<b>Smoking</b>				
Still smoking			3	12
Never smoked			10	40
Stopped smoking			12	48
<b>Using alcohol</b>				
Still using alcohol			3	12
Not using alcohol			22	88

Abbreviation: COPD, chronic obstructive pulmonary disease.

#### 4.2 | Problems of COVID-19 patients according to the problem classification scheme

Among the COVID-19 patients in this study, eight problems in physiological and health-related behaviours domains of the Problem Classification Scheme of the Omaha System were diagnosed for

a total of 269 times. The problems were Communicable/infectious condition (34.9% [94]), Respiration (28.3% [76]), Circulation (11.9% [32]), Pain (8.2% [22]), Nutrition (6.7% [18]), Personal care (4.5% [12]), Substance use (3.3% [9]) and Sleep and rest patterns (2.2% [6]). Communicable/infectious condition problem was diagnosed in all 25 COVID-19 patients while Respiration problem was not diagnosed in three of the patients at all. All of the problems were diagnosed as individual problems, 95.3% were diagnosed as actual problems and 4.8% were diagnosed as potential problems. The potential problems were diagnosed in Communicable/infectious condition, Respiration and Nutrition problems. The 10 most frequent signs and symptoms of the patients were infection (29.1% [70]), biological hazards (29.1% [70]), positive screening/culture/laboratory results (29.1% [70]), lack of infection control measures (29.1% [70]), coughing (17.6% [36]), high fever (14.8% [34]), abnormal breathing types (13.7% [32]), abnormal laboratory results related to breathing (12.7% [30]) abnormal breathing sounds (11.8% [28]), abnormal blood pressure measurements (11.8% [28]) and audible breathing (10.5% [26]) respectively. Other signs and symptoms of the COVID-19 patients in the study are shown in Table 2.

#### 4.3 | Nursing Interventions for COVID-19 Patients According to the Intervention Scheme

A total of 3998 interventions were applied to the patients using 41 of the 76 targets in the Omaha System Intervention Scheme. The five most frequently used targets were infection precautions (14.5% [581]), medication action/side effects (14.0% [561]), signs/symptoms-physical (12.6% [503]), dietary management (8.3% [331]) and nursing care (6.4% [257]) respectively. A total of 3998 interventions for target were applied: interventions in the category of teaching, guidance and counselling were applied 1763 times (44.1%); those in the category of surveillance were applied 1073 times (26.8%); those in the category of case management were applied 981 times (24.5%); and those in the category of treatment and procedures were applied 181 times (4.5%). Figure 1 summarizes the problems of the inpatients and their recorded categories, targets and frequency of interventions.

#### 4.4 | Intervention outcomes of COVID-19 patients according to the problem rating scale

The variation in the COVID-19 patients' pre- and post-intervention scores of knowledge, behaviour and status for the eight problems diagnosed are shown in Figure 2. The pre-intervention (knowledge-behaviour-status) scores indicate the mean scores when the problems were first diagnosed prior to any intervention, and the post-intervention (knowledge-behaviour-status) scores indicate the mean scores when the problems were diagnosed for the last time (Figure 2).

TABLE 2 Health problems and signs-symptoms according to Omaha System-Problem Classification List of COVID-19 inpatients (N = 25)

Domains	Problems	Signs/Symptoms	(n)	(%)
Physiological Domain	Communicable/infectious condition	Infection	70	29.1
		Biological hazards	70	29.1
		Positive screening / culture / laboratory results	70	29.1
		Lack of infection control measures	70	29.1
		High fever	34	14.8
		Insufficient tools / materials / policies to prevent contamination	10	4.1
	Respiration	Coughing	36	17.6
		Abnormal breathing types	32	13.7
		Abnormal breathing sounds	28	11.8
		Audible breathing	26	10.5
		Abnormal laboratory results related to breathing	30	12.7
		Unable to breathe independently	6	2.5
	Circulation	Cyanosis	2	0.8
		Abnormal blood pressure measurements	28	11.8
	Pain	Expressing discomfort / pain	16	6.7
		Inability to stand	12	5.1
		Grimace	14	5.9
		Pale appearance / sweating	4	1.7
		Pulse / respiratory rate / increased blood pressure	4	1.7
Health-related Behaviors Domain		Nutrition	Overweight: BMI 95th percentile or more	18
	Low weight (BMI being 18.5 and below in adults, 5th percentile and below in children)		2	0.8
	Inability to maintain the recommended nutrition program		10	4.1
	Lacks established standards for daily caloric/fluid intake		8	3.3
	Hyperglycaemia		4	1.6
	Personal care	Inadequate bathing	8	3.3
		Difficulty in lower body wear	8	3.3
		Upper body wear	8	3.3
		Oral care / tooth brushing / flossing	8	3.3
		Inability to wash / comb hair	8	3.3
	Substance use	Smoking / use of cigarettes / tobacco products	10	4.2
	Sleep and rest patterns	Frequent waking at night	2	0.8

## 5 | DISCUSSION

This is the first study to identify the nursing problems of COVID-19 patients, to evaluate the nursing interventions applied and the care outcomes, and thus to create a comprehensive nursing care management plan. This is also the first study to employ an international taxonomy and EHR software in the nursing care for COVID-19 patients. Out of 25 cases included in the study, only one patient died, but the others were discharged with recovery. That one patient, who died, was 39 years old, had a diagnosis of diabetes mellitus, and died after a 15-day stay in the unit. According to data published by Turkish

Ministry of Health on April 7, 2020, the highest number of confirmed COVID-19 cases in Turkey was in the age group 25 to 30 years while the average age of the majority of the cases were in the age group 25 to 45 years. Despite the fact that the majority of the cases were in younger age groups, the highest mortality was in the age group 65 to 80 years, particularly in the age group 70 to 75 years (Ministry of Health of Turkey, 2020). In this regard, it is an interesting result that the patient who died during this study was in an age group different from the average age groups in Turkey. Also, most of the COVID-19 patients in this study were male. Similarly, data from Turkish Ministry of Health showed that the majority of patients who were diagnosed



with COVID-19 or who died due to COVID-19 were male (Ministry of Health of Turkey, 2020).

Out of 25 patients in this study, 14 patients had at least one serious chronic disease such as diabetes mellitus, hypertension or cancer, but 11 patients did not have any chronic diseases. Similarly, WHO reported that people with pre-existing conditions (e.g. heart diseases, diabetes mellitus and respiratory diseases) might be at higher risk for severe illness from COVID-19 (WHO, 2020). In addition, similar to our results, patients had diabetes mellitus, hypertension, ischemic heart disease and cancer in a study conducted by Kato et al. (2020) with COVID-19 patients on the Diamond Princess cruise ship and in a meta-analysis conducted by Borges do Nascimento et al. (2020) with COVID-19 patients. In fact, the vital findings of the patients in this study were quite similar to those of the patients in the study of Kato et al. (2020) (Table 1).

Among the patients in this study, 33.5% were overweight and 42.2% were obese. WHO announced that overweight and obesity are significant risk factors for COVID-19 (WHO, 2020). In addition, according to experts, COVID-19 patients with complications such as obesity and especially diabetes might be at higher risk for developing a more serious disease that requires hospitalization and possibly invasive ventilation (Dietz & Santos-Burgoa, 2020; Kassir, 2020; Samuels, 2020).

In Turkey, among the patients who were positive for COVID-19 tests, those who showed evidence of pneumonia only on their x-ray examinations along with other common symptoms such as fever, cough and pain were treated in pandemic units. Therefore, findings of pneumonia were found in the x-ray imaging tests of all the patients included in the study. In addition, the results of the blood tests performed on the first day of hospitalization of the patients in this study were reported in the findings of the study. The blood values recorded prior to the treatment of COVID-19 patients could be significant for assessing the clinical findings of the disease. As mentioned in the findings of the study, although findings of pneumonia were detected in the x-ray images of the patients, it was found that the CRP blood test values differed among the patients. In addition, regular D-dimer, aPTT and PTT blood tests were performed for the patients and enoxaparin sodium 0.6 mg was administered based on the results of the patients. Also, all the patients received Favipiravir 200 mg, Oseltamivir 75 mg and Hydroxychloroquine Sulphate 200 mg twice a day and Azithromycin 250 mg once a day.

For the COVID-19 patients in this study, eight of the 42 problems in the Omaha System Problem Classification Scheme were diagnosed 269 times. The most common problem among all the patients was Communicable/infectious condition, followed by Respiration. Among the other nursing problems diagnosed were Circulation, Pain, Nutrition, Personal care, Substance use and Sleep and rest patterns. Currently, there are not any published studies on the nursing diagnoses of COVID-19 patients. The existing research deals primarily with patients' symptoms. In their meta-analysis, Borges do Nascimento et al. (2020) showed that the most common symptoms in patients with SARS-CoV-19 infection are fever, cough, muscle aches, fatigue and dyspnoea. Kato et al. (2020) identified

symptoms of fever, cough, sore throat, headache, muscle aches, fatigue, shortness of breath and diarrhoea. Similarly, in this study, the diagnosed problems were fever, coughing, abnormal breathing sounds, abnormal breathing types, pain and nutrition (Table 2). A review of the previous studies conducted with COVID-19 patients shows that only results focusing on the symptoms of COVID-19 are discussed. In the present study, on the other hand, the patients were approached in a holistic manner by using the Omaha System, all the actual and potential diagnoses, signs and symptoms of the patients were determined, and nursing interventions were planned and implemented for all their problems. Consisting of 42 problems and 335 symptoms and signs, the Omaha System provided a comprehensive description of the patients in this study. As seen in Table 2, different problems and signs/symptoms such as lack of personal care, sleep disorders and tobacco/alcohol use were identified among the patients, interventions were applied to all of them, and the outcomes were evaluated. When faced with a previously unknown disease such as COVID-19, providing care using an international taxonomy with proven validity and reliability could increase the quality of care by facilitating the treatment and recovery process. In the present study, all the problems of the patients were scored using the Problem Rating Scale both before and after the intervention, and the success of the nursing interventions were evaluated. As can be seen in Figure 2, the patients' knowledge, behaviour and status scores improved significantly for all the problems. Figure 1 shows the nursing interventions for the patients' problems. A total of 3998 interventions were applied to the patients using 41 targets in the Omaha System Intervention Scheme. The most frequently applied targets for intervention were infection precautions, medication action/side effects, signs/symptoms-physical, dietary management and nursing care. These interventions were performed using the categories of teaching, guidance and counselling; surveillance; case management; and treatment and procedures respectively. In this study, data were collected from the first patients hospitalised during the early days of COVID-19 in Turkey. Due to the lack of knowledge of patients about the COVID-19, treatment methods applied, drugs and side effects, and especially the continuation of infection measures after discharge, the nurses most frequently depended on the teaching, guidance and counselling category for their practice. The category of surveillance, on the other hand, is used for ongoing nursing interventions with sequential monitoring. Therefore, the fact that the follow-up of fever, pulse, blood pressure, respiration, oxygen level in the blood, laboratory and radiological imaging findings of patients hospitalized in pandemic units is given second place among all nursing interventions is an important finding in terms of establishing care guidelines for COVID-19 patients.

## 5.1 | Limitations

The primary limitation of this study is that there are currently not any similar studies using the Omaha System or other international classification systems with COVID-19 patients. For this reason, the

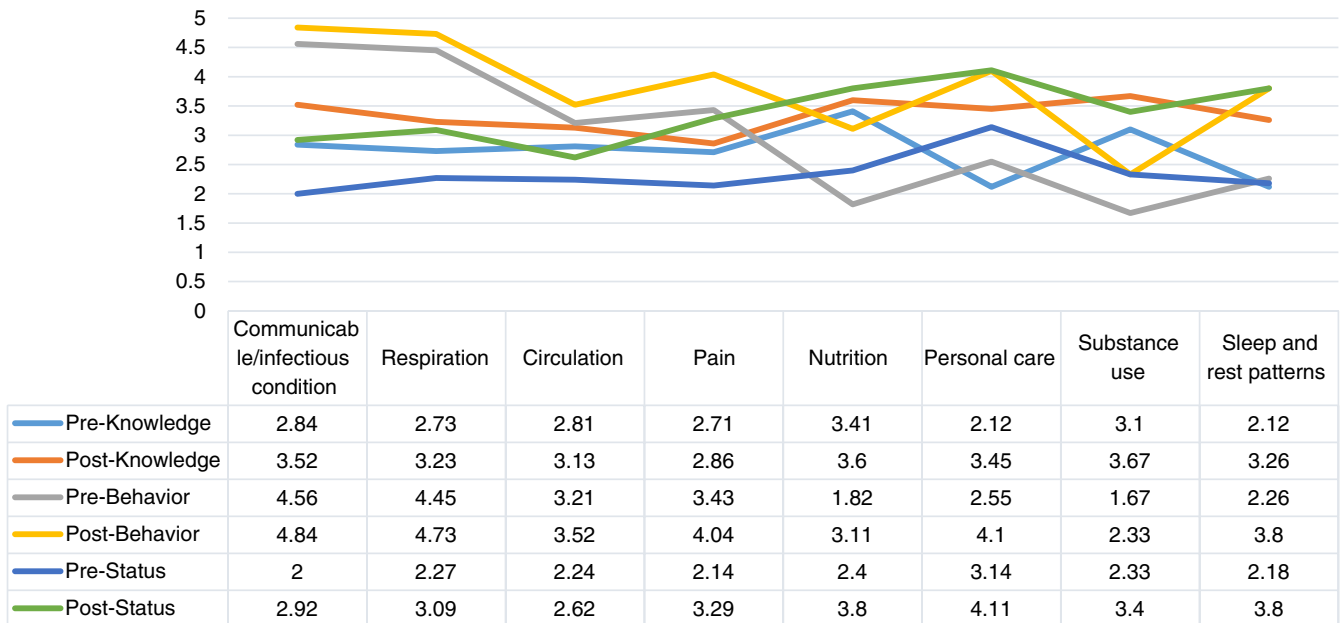


FIGURE 2 Knowledge, behavior and status of COVID-19 inpatients' problems [Colour figure can be viewed at [wileyonlinelibrary.com](https://onlinelibrary.com)]

nursing diagnoses, the interventions and the outcomes in this study could not be compared with the results from other studies. Also, the number of cases had to be limited to 25 as the pandemic unit where the patients were treated was closed on 13 May 2020.

## 6 | CONCLUSIONS

The results of this study showed that the COVID-19 patients frequently had problems of communicable/infectious condition, respiration, circulation, pain, nutrition, personal care, substance use, and sleep and rest patterns, and they often exhibited symptoms and signs of infection, fever, cough, respiratory distress, pain, high blood pressure and nutrition. The interventions applied to the patients most frequently were infection precautions, medication action/side effects, signs/symptoms-physical, dietary management and nursing care. These interventions were applied using the categories of teaching, guidance and counselling; surveillance; case management; and treatment and procedures respectively. The Omaha System provided effective guidelines for diagnosing the problems, planning and implementing appropriate interventions for the COVID-19 patients in this study. This study presented findings regarding the most common problems that nurses could encounter in COVID-19 patients, the interventions applied to them and the outcomes tested successfully. While the pandemic process continues all over the world, the importance of nursing care in reducing the number of deaths in COVID-19 patients and accelerating the treatment process is indisputable. Therefore, the use of the Omaha System in nursing care of COVID-19 patients could increase the quality of care, ensure the use of a common language among nurses all over the world and thus accelerate the recovery process in patients.

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## CONFLICT OF INTERESTS

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.

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