

# Nursing interventions during the covid-19 pandemic: The decisive role of patients' dependency levels

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**ABSTRACT.** To determine the dependency levels of patients and the nursing interventions in a pandemic clinic, and to examine the decisive role of patient dependency levels in nursing interventions. This research is a retrospective descriptive study. The sample of the research was composed of 108 Covid-19 patients hospitalized in Turkey. The data was obtained from electronic patient records of the hospital. Data analysis was carried out using descriptive statistics, and Chi-square test for trend analysis. In this research, 49.1% of the Covid-19 patients hospitalized were in moderately and highly dependent patient groups. Indirect nursing interventions were performed to all patients, and direct nursing interventions determined based on patients' needs were not performed to all patients. It was found that there was a linear relationship between all nursing interventions and dependency levels ( $p < 0.001$ ). It was concluded that the dependency levels of patients and the nursing interventions performed by nurses were affected in the Covid-19 pandemic. Nurse managers should take into account that patients' dependency levels affect the implementation of nursing interventions and ensure that patient care is provided by considering their dependency levels during the pandemic process.

**Keywords:** Covid-19; classification; nursing interventions; pandemic; patients; dependency levels.

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## Introduction

Many countries struggle with already existing health workforce challenges including shortages, misdistribution, and misalignment of needs and skills (World Health Organization [WHO], 2020a; World Health Organization [WHO], 2020b). The Covid-19 pandemic introduced additional challenges such as the redistribution of staff to treat the increasing numbers of patients with Covid-19 and the loss of staff due to getting quarantined, infected or being needed to care for friends and family. These factors have further affected the accessibility and capability of health workers to provide essential services and meet the growing needs (WHO, 2020a). Moreover, the epidemiology of the virus contributes to an increased demand in the health workforce while reducing the supply of the health workers (Bourgeault et al., 2020). To cope with this challenge, the WHO (2020) made recommendations at the individual, organizational and systematic level to improve the health workforce. These recommendations, which include the organization of care delivery pathways, anticipating health workers' absenteeism due to illness or quarantine in planning, analyzing the existing health workforce and identifying shortages in all areas, focus on the effective and efficient use of health workforce (WHO, 2020c). In this context, it is extremely important to plan nurse workforce as nurses constitute the majority of the healthcare workers.

In addition to the increase in the workload of healthcare professionals in the Covid-19 pandemic, the patients' health and the need for health care have also been affected. The measures taken by the countries to limit the transmission of Covid-19 created barriers to accessing health care and caused individuals to self-manage many health needs. Furthermore, other barriers associated with the pandemic have led to complications and morbidity, such as an increase in noncommunicable diseases (NCDs) or advanced infections. Policies to limit transmission during the Covid-19 pandemic increased the need for health care in conjunction with an overall increase in mental health conditions, such as depression, anxiety and substance abuse disorders (WHO, 2020a). Moreover, the measures taken during the pandemic have affected the livelihood of the people, directly or indirectly leading to increases in psychological morbidities

(Krishnamoorthya et al., 2020). In the literature, the most common psychological morbidities were poor sleep quality, stress, anxiety, depression, psychological distress, insomnia and fear (Krishnamoorthya et al., 2020; Shaukat et al., 2020). Patient dependency, known as the degree of nursing care, required for patients, has major implications for nursing (Crouch & Williams, 2006). The patient dependency classification system is a strategy developed to classify patients according to the amount and complexity of their nursing care needs and to plan adequate number of staff (Adomat & Hewison, 2004; Gelbcke et al., 2018). The purpose of Patient Classification System (PCS) is to identify the intensity of nursing care for a patient or group of patients, including both direct and indirect nursing requirements (Williams & Crouch, 2006).

Dijkstra et al. (1996) defined patient dependency as a process in which the professional provides support to a patient whose self-care skills have diminished and whose care demands make them dependent to a certain extent, so as to restore that patient's independence in performing self-care (Dijkstra et al., 1996; Morris et al., 2007). Nursing workload refers to the amount of performance required to carry out nursing activities in a given time period. The concepts of "patient dependency" and "nursing intensity" are used to measure nursing workload, although these concepts differ in their definitions. Several ways have been described in the literature to measure nursing workload. These include its conceptualization in terms of nursing intensity, patient dependency, clinical acuity, or severity of patient illness, as well as the complexity of required care and the time taken to perform patient care (Morris et al., 2007). Patient dependency classification systems, which are the best way to estimate nursing workload, are not an adequate measure of workload because they only cover one aspect of the nurse's job (Hurst 2005; Morris et al., 2007). Nursing intensity refers to as a measure of the amount and complexity of nursing care that is needed by a patient. One of the commonly used measures of nursing intensity is the Nursing Interventions Classification (NIC) (Adomat & Hewison, 2004). The NIC is a comprehensive classification of nursing treatments that focuses on interventions. The NIC defines a nursing intervention as "any treatment based upon clinical judgment and knowledge that a nurse performs to enhance patient/client outcomes" (Butcher et al., 2018; Ameen et al., 2020). The NIC consists of seven domains, 30 classes, and 565 interventions. It provides the use of standard language in care and enables management, transmission, recording and documentation of care (Biol, 2016). The NIC interventions are defined according to their goals and consist of a list of actions that can be changed by individual care needs (Butcher et al., 2018; Ameen et al., 2020). The interventions contain both direct and indirect interventions. Direct care is defined as all nursing care activities performed in the presence of the patient and/or family, but indirect care is nursing care activities done away from the patient but on his/her behalf (Thoroddsen, 2005). The level of direct/indirect patient care activities is measured by way of nursing intensity. The level of nursing intensity has a direct impact on the level of nursing workload and is influenced by the patient's dependence on the nurse, the severity of the patient's illness, the time taken to perform patient care, and the complexity of the care required to provide appropriate care to the patient (Morris et al., 2007).

The present study aimed to (1) determine the dependency levels of patients and the nursing interventions in a pandemic clinic, and (2) to examine the decisive role of patient dependency levels in nursing interventions.

## Material and methods

### Study design

This is a retrospective descriptive study. It was conducted and reported according to the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) checklist.

### Sample and setting

The research data were collected from a training and research hospital that has been serving as a pandemic hospital since the beginning of the pandemic in Turkey. The universe of the research was consisted of all patients hospitalized in a training and research hospital between March and June 2020. The sample of the research was composed of 108 Covid-19 patients hospitalized in a pandemic clinic.

### Instruments

*Patient Information Form:* This form covers sociodemographic and disease characteristics, including age, gender, discharged reason, additional conditions, medication etc.

*Rush Medicus Patient Classification Scale:* The scale was developed to evaluate the relationship between nurse workforce and patient care quality in 1972 (Middleton & Lumby, 1998), and was used to determine patients' dependency levels. It includes 29 parameters that define how much a patient depends on a nurse/caregiver to meet their care needs. According to these parameters, the care needs of the patients were evaluated, and the dependency levels of the patients were determined based on the total scores. The scores are interpreted as independent patient (Type I: 0-24 points), low-level dependent patient (Type II: 25-48 points), moderate-level dependent patient (Type III: 49-120 points), high-level dependent patient (Type IV: Over 120 points) (Türkmen, 2014; Bozkurt et al., 2017; Akatın et al., 2019).

*Nursing Interventions List:* The Nursing Regulation, published in 2010 in Turkey (Official Gazette, Issue: 27515), was updated in 2011. The aim of the Nursing Regulation is to determine the duties, authorities and responsibilities of nurses working in organizations that provide health services, according to their work areas, positions and educational status. The nursing interventions list was included in the Nursing Regulation and prepared according to NIC. Nursing interventions consist of 5 main parts, including data collection, determination of nursing diagnoses or common care problems, determination of care goals, determination of treatment and common care interventions with the health care team, plan, treatment and implementation of common care interventions with the health care team. There are a total of 473 nursing interventions in the Nursing Interventions List. Some of the nursing interventions in this list are bleeding control, pain management, urine sample taking, monitoring of fluid intake/output, etc. In this study, nursing interventions were evaluated using interventions list included in the Regulation for Amendment about Nursing Regulation (2011), which was published in the Official Gazette in 2011. Nursing interventions were handled based on their implementation, with the ones that were the most commonly used in the pandemic clinic included in the study.

### **Research question**

Is there a linear relationship between the dependency levels of patients and the nursing interventions that nurses performed?

### **Data collection method**

Data were collected by the researcher (EBD) working in the same clinic. However, data were not allowed to collect from other clinics due to isolation measures. The data was obtained from electronic patient records (EPRs) of the hospital. In addition to sociodemographic and disease characteristics, nursing interventions were also available in the EPRs. Furthermore, patients' dependency levels were routinely calculated using the Rush Medicus Patient Classification Scale by EBD, the researcher in this study. Dependency levels of the patients were calculated considering the day they were most dependent, and nursing intervention data were also collected on the same day to examine the decisive role.

### **Ethical statement**

The Izmir University of Health Sciences Tepecik Training and Research Hospital Ethics Committee where the study was conducted granted ethical approval for the research (Approval number: 2020/ 9-3; The approval date: July 27, 2020).

### **Data analysis**

Statistical analysis was performed using the IBM SPSS Statistics - Version 23.0 (2015). The analysis of the data was carried out using descriptive statistics, and Chi-square test for trend.

## **Results**

### **Study sample characteristics**

Most of the patients (57.4%) were male, were discharged reason for home quarantine (52.8%), and had no additional conditions (66.7%). Most of the patients who had additional conditions (58.3%) had more than one. The majority (89.8%) had both oral and parenteral medication, and the frequency of vital signs measured in a day was 4\*1 (every six hours) in 42.6% of the patients. The mean age of the patients was 54.96 years ( $SD = 17.48$ ), and the mean length of hospital stay was 6.21 days ( $SD = 3.96$ ).

### Patients' dependency levels

It was determined that 25.9% of the patients were independent patients, 25% were low-level dependent patients, 35.2% were moderate-level dependent patients and 13.9% were high-level dependent patients (Table 1).

**Table 1.** Rush Medicus Patient Classification Scale ( $n = 108$ ).

Patients' Dependency Levels	n	%
Independent patient (0-24 points)	28	25.9
Low-level dependent patient (25-48 points)	27	25.0
Moderate-level dependent patient (49-120 points)	38	35.2
High-level dependent patient (>120 points)	15	13.9

### The nursing interventions

The nursing interventions including data collection, nursing care plans, infection control and health system management performed to all patients are given in Table 2. Data collection includes patient admission, vital signs monitoring, assessment of mental status, electrocardiography (ECG) monitoring, monitoring of respiration using a monitor, shift report and so on. Nursing care plans included evaluation and interpretation of deviations from normal in patient-related data or care application outcomes, determining nursing goals for the solution of the identified problems, the interventions to be applied to reach the desired level of health, and implementation of nursing care interventions (Table 2).

**Table 2.** Nursing Interventions Performed to All Patients ( $n = 108$ ).

Data Collection	Patient admission Vital signs monitoring Assessment of mental status System evaluation (respiratory etc.) Electrocardiography (ECG) monitoring Monitoring oxygen saturation Monitoring of respiration using a monitor Monitoring of body temperature using a monitor Shift report
Nursing Care Plans	Evaluation and interpretation of deviations from normal in patient-related data or care application outcomes Determining nursing goals for the solution of the identified problems Determining the interventions to be applied to reach the desired level of health Implementation of nursing care interventions
Infection Control	
Health System Management	

Bleeding control (84.3%), drug management (98.1%), and exercises to support spontaneous breathing (84.3%) were the most frequently used nursing interventions to patients. Following these interventions, two nursing interventions, namely skin and mucosal integrity protection measures and hair care were performed to more than 70% of patients. Another six nursing interventions were used on more than a quarter of the patients. These interventions were exercised to improve coughing, bathing, activity and exercise management, immobility management, oxygen treatment, and urine sample taking. Electrolyte and acid-base management and postural drainage interventions were performed to 39.8% of the patients (Table 3).

**Table 3.** Nursing Interventions Not Performed to All Patients ( $n = 108$ ).

		n	%
Data Collection	Bleeding control		
	Yes	91	84.3
	No	17	15.7
	Urine sample taking		
	Yes	44	40.7
	No	64	59.3
	Pain management		
	Yes	31	28.7
	No	77	71.3

Interventions for Physiological Basic Requirements	Monitoring of fluid intake/output			
	Yes	40	37.0	
	No	68	63.0	
	Activity and exercise management			
	Yes	47	43.5	
	No	61	56.5	
	Elimination management			
	Yes	36	33.3	
	No	72	66.7	
	Immobility management			
Self-care Facilitation	Yes	46	42.6	
	No	62	57.4	
	Nutrition support			
	Yes	28	25.9	
	No	80	74.1	
	Skin and mucosal integrity protection measures			
	Yes	84	77.8	
	No	24	22.2	
	Dressing and undressing			
	Yes	33	30.6	
Interventions for Physiological Complex Requirements	No	75	69.4	
	Perineal care			
	Yes	28	25.9	
	No	80	74.1	
	Hair care			
	Yes	78	72.2	
	No	30	27.8	
	Bathing			
	Yes	50	46.3	
	No	58	53.7	
Respiratory Management	Electrolyte and acid-base management			
	Yes	43	39.8	
	No	65	60.2	
	Drug management			
	Yes	106	98.1	
	No	2	1.9	
	Aspiration prevention interventions			
	Yes	30	27.8	
	No	78	72.2	
Skin/wound management	Oxygen treatment			
	Yes	46	42.6	
	No	62	57.4	
	Improving coughing			
	Yes	58	53.7	
	No	50	46.3	
	Postural drainage			
	Yes	43	39.8	
	No	65	60.2	
	Exercises to support spontaneous breathing			
Behavior therapy	Yes	91	84.3	
	No	17	15.7	
	Skin/wound management			
	Yes	21	19.4	
	No	87	80.6	
	Behavior therapy			
	Yes	40	37.0	
	No	68	63.0	

### Patients' dependency levels and nursing interventions

The dependency levels of patients and some nursing interventions were compared in Table 4. The results of a chi-square test for trend were given as a Linear-by-Linear association for all variables. There was a linear relationship between all nursing interventions and dependency levels ( $p < 0.001$ ). Although there was a decrease in low-level dependent patients in nutrition support, bathing and aspiration prevention interventions from nursing interventions, it was still statistically significant in terms of linear relationship (Table 4).

**Table 4.** Comparison of the dependency levels of patients and some nursing interventions ( $n = 108$ ).

	Independent Patient ( $n = 28$ )		Low-level Dependent Patient ( $n = 27$ )		Moderate-level Dependent Patient ( $n = 38$ )		High-level Dependent Patient ( $n = 15$ )		Test Statistic
	n	%	n	%	n	%	n	%	
Urine sample taking									
Yes	6	21.4	7	25.9	20	52.6	11	73.3	$\chi^2:14.329$
No	22	78.6	20	74.1	18	47.4	4	26.7	$p = 0.000^*$
Pain management									
Yes	3	10.7	4	14.8	16	42.1	8	53.3	$\chi^2:13.363$
No	25	89.3	23	85.2	22	57.9	7	46.7	$p = 0.000^*$
Monitoring of fluid intake/output									
Yes	2	7.1	6	22.2	18	47.4	14	93.3	$\chi^2:32.547$
No	26	92.9	21	77.8	20	52.6	1	6.7	$p = 0.000^*$
Activity and exercise management									
Yes	3	10.7	9	33.3	20	52.6	15	100	$\chi^2:31.747$
No	25	89.3	18	66.7	18	47.4	0	0	$p = 0.000^*$
Elimination management									
Yes	1	3.6	5	18.5	15	39.5	15	100	$\chi^2:37.710$
No	27	96.4	22	81.5	23	60.5	0	0	$p = 0.000^*$
Immobility management									
Yes	2	7.1	8	29.6	21	55.3	15	100	$\chi^2:37.231$
No	26	92.9	19	70.4	17	44.7	0	0	$p = 0.000^*$
Nutrition support									
Yes	1	3.6	0	0	14	36.8	13	86.7	$\chi^2:38.032$
No	27	96.4	27	100	24	63.2	2	13.3	$p = 0.000^*$
Skin and mucosal integrity protection measures									
Yes	14	50.0	20	74.1	35	92.1	15	100	$\chi^2:20.393$
No	14	50.0	7	25.9	3	7.9	0	0	$p = 0.000^*$
Dressing and undressing									
Yes	0	0	3	11.1	15	39.5	15	100	$\chi^2:45.117$
No	28	100	24	88.9	23	60.5	0	0	$p = 0.000^*$
Perineal care									
Yes	0	0	2	7.4	13	34.2	13	86.7	$\chi^2:38.032$
No	28	100	25	92.6	25	65.8	2	13.3	$p = 0.000^*$
Bathing									
Yes	6	21.4	5	18.5	25	65.8	14	93.3	$\chi^2:20.073$
No	22	78.6	22	81.5	13	34.2	1	6.7	$p = 0.000^*$
Electrolyte and acid-base management									
Yes	2	7.1	5	18.5	22	57.9	14	93.3	$\chi^2:38.255$
No	26	92.9	22	81.5	16	42.1	1	6.7	$p = 0.000^*$
Aspiration prevention interventions									
Yes	2	7.1	1	3.7	15	39.5	12	80.0	$\chi^2:29.770$
No	26	92.9	26	96.3	23	60.5	3	20.0	$p = 0.000^*$
Oxygen treatment									
Yes	4	14.3	6	22.2	23	60.5	13	86.7	$\chi^2:28.496$
No	24	85.7	21	77.8	15	39.5	2	13.3	$p = 0.000^*$
Improving coughing									
Yes	8	28.6	11	40.7	26	68.4	13	86.7	$\chi^2:18.174$
No	20	71.4	16	59.3	12	31.6	2	13.3	$p = 0.000^*$
Postural drainage									
Yes	3	10.7	5	18.5	23	60.5	12	80.0	$\chi^2:29.308$
No	25	89.3	22	81.5	15	39.5	3	20.0	$p = 0.000^*$
Skin/wound management									
Yes	0	0	1	3.7	10	26.3	10	66.7	$\chi^2:28.093$
No	28	100	26	96.3	28	73.7	5	33.3	$p = 0.000^*$
Behaviour therapy									
Yes	2	7.1	6	22.2	19	50.0	13	86.7	$\chi^2:30.355$
No	26	92.9	21	77.8	19	50.0	2	13.3	$p = 0.000^*$

\* $p < 0.001$ ,  $\chi^2$ : Chi-square test for trend.

## Discussion

The combination of increased workload and a reduced number of health workers severely strains the capacity to maintain essential services in the Covid-19 pandemic (WHO, 2020a). During this process, nurse workforce was also influenced by increasing workload and decreasing number of active nurses due to being infected or quarantined. Furthermore, the regulation of health practices based on the current situation including the assignment of clinician nurses to the contact tracing teams, and the assignment of nurses to the intensive care units because of rising number of patients who needs intensive care affected nurse workforce in Turkey. Determining the care needs of patients plays an important role in nurse workforce planning. WHO (2020a) stated that Covid-19 can cause negative outcomes on individuals who have noncommunicable diseases (NCDs) such as cardiovascular diseases, cancer, diabetes, and chronic respiratory diseases. This risk of these negative outcomes is higher in Covid-19 infection and there is a higher case fatality rates among people with NCDs. Thus, it can be said that the care needs of the patients and thus their dependency levels were affected during the pandemic. This study found that 25.9% of the patients were independent patients, 25% were low-level dependent, 35.2% were moderate-level dependent and 13.9% were high-level dependent. Another study, it was reported that 50.37% of the patients were independent, 42.47% were low-level dependent, 18.56% were moderate-level dependent and 3.47% were high-level dependent in the surgical units, and 30.08% were independent, 37.69% were low-level dependent, 28.10% were moderate-level dependent and 8.9% were high-level dependent in the internal medicine units (Akatin et al., 2019). Gelbcke et al. (2018) found that patients require minimal care (37.6%), intermediate care (48.2%), high-dependency care (12.9%), semi-intensive care (1.1%). In this study, due to the high occupancy rate of intensive care units in the pandemic, the fact that 49.1% of the patients hospitalized in a clinic were moderate and high-level dependent patients reflects how serious the pandemic is.

Nursing interventions were evaluated using interventions list in the Regulation for Amendment about Nursing Regulation (2011), prepared in line with NIC. In this research, it was noticed that indirect nursing interventions such as patient admission, system evaluation, shift report, determining the care plan of patients and the implementation of interventions were performed to all patients. Moreover, many interventions such as vital signs monitoring, assessment of mental status, ECG monitoring from direct nursing interventions were performed to all patients. Nursing interventions that were not performed to all patients were direct nursing interventions determined based on patients' needs. Besides, the most frequently used nursing interventions were bleeding control, self-care facilitation, drug management and respiratory management. In a study, it was reported that the most frequently used indirect nursing interventions were documentation, order transcription, physician support, shift report, and the most frequently used direct nursing interventions were medication administration, pain management, vital signs monitoring, touch, presence, active listening, skin surveillance (Thoroddsen, 2005).

The increase in the dependency levels of the patients is related to the general condition of the patient, assisted/unassisted functions, the required interventions, and the type and duration of treatment (Zaybak et al., 2012). In this research, it was concluded that the more dependent the patient was, the more frequent nursing interventions were performed. It was noteworthy that patients' dependency levels and nursing interventions were highly correlated during the Covid-19 pandemic. It can therefore be concluded that the nursing workload increased because of the increase in patients' dependency levels and therefore the frequency of implementing nursing interventions. In the literature, while research has shown the usefulness of the NIC to represent nursing care activities, it has not been used to measure nursing workload (De Cordova et al., 2010). De Cordova et al. (2010) emphasized that using standardized nursing terminology such as the NIC is important to create a valid measure of nursing workload. In addition, PCS is one of the methods used in nurse workforce planning and measuring nursing workload. However, nursing workload was not measured due to the high density of hospitals and the isolation measures implemented in hospitals in this study. Besides these reasons, the opening of temporary intensive care units because of the rising number of patients in needs of intensive care, and the daily change in the number of nurses owing to infected or quarantined nurses were the other reasons why nursing workload was not measured.

The limitations of this research include that the study was carried out only in a pandemic service and its results cannot be generalized to other clinics and hospitals, and that nursing workload was not measured.

## Conclusion

It was found that the dependency levels of patients were influenced in the Covid-19 pandemic. It was also determined that all nursing interventions were not performed to all patients and the most frequently used nursing interventions were bleeding control, self-care facilitation, drug management and respiratory management. It was concluded that there was a relationship between the dependency levels of patients and nursing interventions, and nursing interventions were performed more frequently as the dependency levels of patients increased in this study. According to these results, it can be said that the dependency levels of patients and the nursing interventions performed by nurses were also affected in the Covid-19 pandemic. Furthermore, in addition to being exposed to some dangers and risks such as Covid-19 transmission and fear of spreading the virus to their families, friends or colleagues, long working hours, psychological distress, fatigue, and burnout, the increasing nursing workload owing to changing patient profiles and more frequent nursing interventions made the pandemic process more difficult for nurses who are at the frontlines of the fight against Covid-19. Thus, this research reveals the importance of effective workforce planning in fighting the extraordinary process of the pandemic. We can suggest improving the health workforce at individual, organizational and systematic levels in line with the recommendations of the World Health Organization [WHO], (2020c). We can also recommend making regulations to reduce nurses' workload during the pandemic. Moreover, community-level recommendations such as using masks, maintaining social distance and paying attention to hand hygiene to reduce the number of Covid-19 cases and hospitalizations should also be continued. Nurse managers should take into account that patients' dependency levels affect the implementation of nursing interventions and ensure that patients are provided care by considering their dependency levels during the pandemic. According to this study, nurse managers are recommended to make regulations to reduce the workload of nurses based on the pandemic conditions in their country.

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