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RESEARCH ARTICLE

Pressure Ulcer Formation in Patients with a Diagnosis of COVID-19 in the Intensive Care Unit and Affecting Factors

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ABSTRACT

Objective: The objective of the study was to determine the incidence of pressure ulcers and the affecting factors in patients hospitalized in the intensive care unit with a diagnosis of COVID-19.

Materials and Methods: This retrospective descriptive research was designed as a correlational study. In the study, the data of 145 patients hospitalized with a diagnosis of COVID-19 in the 36-bed Third Level Anesthesia and Reanimation Intensive Care Unit of a public hospital in Istanbul between March 11, 2020, and June 08, 2020, were evaluated.

Results: It was determined that the mean age of the patients was 63.37±16.85 years and 60% of them were male. Pressure injuries were detected in 14 (9.7%) of the patients. It was determined that 86 (59.3%) people were at high Braden risk, the mean sedation time was 8.06 ± 8.96 days, 103 (76.3%) were fed enterally, and 116 (80%) had an additional disease other than COVID-19. As a result, the number of hospitalization days, non-invasive, intubated, and sedation days were found to be significantly higher in patients with pressure ulcers compared to those without pressure sores ($p<0.05$).

Conclusion: As a result of the study, it was found that hospitalization days, non-invasive days, number of days intubated, and sedation days were significantly higher in patients with pressure injuries compared to those without pressure injuries, and albumin and hemoglobin values were significantly lower in patients with pressure injuries compared to those without pressure injuries.

Keywords: COVID-19, critical care, nursing care, patient positioning, pressure ulcer

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INTRODUCTION

COVID-19 is a virus that was first identified on January 13, 2020, as a result of the research conducted in a group of patients who developed symptoms in late December 2019 in Wuhan, China's Hubei Province.[1,2] Spreading all over the world, COVID-19 was declared as a pandemic by the World Health Organization (WHO) on March 11, 2020. The coronavirus (CoV) is a large family of viruses that cause a variety of serious illnesses, from the common cold to Middle East respiratory syndrome (CoV) and severe acute respiratory syndrome (CoV).[3] The COVID-19 virus is characterized by fever, shortness of breath, and acute respiratory symptoms, causing pneumonia. This disease is exacerbated in some patients and causes pulmonary edema, multiple organ failure, and acute respiratory distress syndrome (ARDS).[1,2] ARDS, which is a progressive inflammatory lung injury, causes interstitial and intra-alveolar edema and inflammation and progressive gas exchange abnormalities as a result of disruption of the alveolocapillary membrane and changes in alveolar and capillary structures, leading to the development of respiratory distress/failure.[4]

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Prone positioning, which is among the treatment methods used in ARDS patients, can also be used as an adjuvant therapy to improve ventilation in COVID-19 patients.[5] The prone position is defined as lying in a horizontal position with the front of the body facing down. Prone position provides homogeneous distribution of inspiratory air into the lungs, balances ventilation and tissue perfusion, and relieves pressure and tension on the lungs.[4] In a meta-analysis study, it was reported that the mortality rate decreased with low tidal volume oxygen therapy in the prone position in the first 48 h.[6] According to the Adult Patient Treatment Guide published by the Ministry of Health, it is recommended that COVID-19 patients be placed in the prone position for a long time during the day, even if they are not intubated. If there is no contraindication in severe ARDS cases (PaO_2/FiO_2<150) under mechanical ventilation, the prone position should be applied for more than 12 h daily.[7] In addition to the therapeutic feature of the prone position, one of the most common complications in patients is the formation of pressure ulcers due to the increased pressure in most of the body, especially in the face area.[8] Therefore, precautions should be taken to reduce the risk of pressure ulcers when preparing and caring for the patient for the prone position.[9] The 2019 National Pressure Injury guideline includes measures to prevent pressure ulcers and areas under pressure in the prone position.[10] Pressure injuries, which are largely preventable complications, are chronic wounds that cause increased morbidity and mortality rates, problems such as infection, pain and depression, and prolongation of the individual's hospital stay.[11] Decreased position change in intensive care patients is effective in the development of pressure ulcers. It was shown in studies that long-term immobility and limited activity were risk factors for the development of pressure ulcers since applying high pressure to the same areas for a long time could disrupt the circulation in the skin and subcutaneous tissue.[12]

In the prevention of these injuries, it is important to identify risky patients and to plan and implement interventions to eliminate risk factors and their effects.[13] Pressure injury is a preventable health problem, and nurses have important responsibilities in this regard. For this reason, the following article is included in the duties and responsibilities of intensive care nurses in the Nursing Regulation (2011): "The nurse provides an appropriate nursing approach to prevent the development of pressure ulcers, risk factors, and their effects on prognosis, and plans, applies, and evaluates appropriate nursing care if they occur."[14]

The role of nurses is important in identifying risky patients and planning prevention interventions based on risk factors. The risk of pressure ulcers should be evaluated with validated and reliable assessment tools, and nurses should attempt to eliminate or reduce the risks with evidence-based practices.[15,16] Pressure ulcer development status and differences in COVID-19 patients should be determined, and preventive measures should be taken to guide health professionals in line with this purpose. The objective of the study was to determine the incidence of pressure ulcers and the affecting factors in patients hospitalized in the intensive care unit with a diagnosis of COVID-19.

MATERIALS and METHODS

This retrospective descriptive research was designed as a correlational study. In the study, the data of 145 patients hospitalized with a diagnosis of COVID-19 in the 36-bed Third Level Anesthesia and Reanimation Intensive Care Unit of a public hospital in Istanbul between March 11, 2020, and June 08, 2020, were evaluated. The research sample consisted of patients with a diagnosis of COVID-19 over the age of 18 who were admitted to the Intensive Care Unit at least 24 h before the data were collected in the Anesthesia and Reanimation Intensive Care Unit. At the time of the study, the nurse-patient ratio was 1/2.

Research Questions

1. What is the incidence of pressure ulcers in patients with a diagnosis of COVID-19 hospitalized in the intensive care unit?
2. What are the factors affecting pressure ulcers in patients with a diagnosis of COVID-19 hospitalized in the intensive care unit?

Ethics committee approval was obtained from the Clinical Research Ethics Committee of Istanbul Kanuni Sultan Süleyman Training and Research Hospital before the study. Approval of the study was obtained by applying online through the "Scientific Research Studies on COVID-19" extension (https://bilimselarastirma.saglik.gov.tr/) on the website of the General Directorate of Health Services of the Ministry of Health of the Republic of Türkiye.

Data Collection Tools

In the collection of data in the research, the Patient Information Form, the Braden Scale for Predicting Pressure Sore Risk,[17] the Acute Physiology and Chronic Health Evaluation APACHE II,[18] the Nutritional Risk Screening-NRS- 2002,[16] and the Glasgow Coma Scale[18] were used.

Patient Information Form: The form was developed by the researchers by scanning the literature. The form included 34 questions including the patient's age, gender, body mass in-

Table 1. Distribution of patients' demographic data and descriptive statistics on pressure ulcers

	n	%		n	%
Age (years), mean±SD	63.37±16.85		Intubated	97	66.9
BMI (kg/m^2), mean±SD	27.10±5.07		Non-invasive	6	4.1
Sedation day, mean±SD	8.06±8.96		Prone position		
APACHE II score, mean±SD	21.39±10.12		Not applied	117	80.7
GCS score, mean±SD	12.73±4.27		Applied	28	19.3
NRS, mean±SD	5.41±1.52		Nutritional status		
Low albumin (gr/dL), mean±SD	21.22±5.72		Not feeding	10	6.9
Low Hgb (gr/dL), mean±SD	8.74±2.06		Feeding	135	93.1
Albumin (gr/dL), mean±SD	26.33±4.56		Nutritional pattern		
Hgb (gr/dL), mean±SD	10.40±1.67		Oral	32	23.7
The day the pressure sore occurs after hospitalization, mean±SD	13.09±8.30		Enteral	103	76.3
Gender			Braden pressure sores risk		
Male	87	60.0	Risk free	38	26.2
Female	58	40.0	Medium risk	21	14.5
Smoking			High risk	86	59.3
No	137	94.5	Pressure ulcer		
Yes	8	5.5	No	131	90.3
Alcohol			Yes	14	9.7
No	142	97.9	Restriction status		
Yes	3	2.1	Not applied	39	26.9
Chronic disease			Applied	106	73.1
No	29	20.0	Type of restriction		
Yes	116	80.0	Physically	3	2.8
Breathing pattern			Medical	102	96.2
Extubated	42	29.0	Physical+Medical	1	0.9

Categorical data were expressed as n, % and numerical data as mean±standard deviation. BMI: Body mass index; APACHE II: Acute physiology and chronic health evaluation II; GCS: Glasgow coma scale; NRS: Nutritional risk screening; Hgb: Hemoglobin; SD: Standard deviation

dex, presence of disease, length of stay in the ICU, type and duration of artificial respiration, nutritional status, sedation use, and laboratory values,. The form was filled by examining the daily follow-up and nursing care forms used.

Statistical Analysis

The distribution of the data was analyzed with the Shapiro-Wilk test. The independent sample t-test was used for the comparisons of the normally distributed data between the two independent groups, and the Mann–Whitney U-test was used for the comparisons of the non-normally distributed data between the two independent groups. Pearson Chi-square, Fisher Exact Chi-Square, and Fisher Freeman Halton tests were used for the statistical comparison of the categorical data. The descriptive statistics of the data were expressed as frequency (percentage), mean±standard deviation, or median (min-max). All statistical analyses were analyzed and reported in the IBM SPSS Statistics 28.0 program at α=0.05 significance level, and 95% confidence level.

RESULTS

One hundred and forty-five patients were included in the study. Most of the patients were male (60%), had at least one chronic disease (80%), and were intubated (66.9%). Most of those included in the study were at high risk (59.3%), considering the Braden Scale for Predicting Pressure Sore Risk. Most of the patients (90.3%) did not have pressure ulcers. The results of the demographic data are given in Table 1.

The statistical comparison results performed according to the presence and absence of pressure ulcers in the patients are given in Table 2.

Table 2. Comparison of demographic data and pressure ulcer data according to pressure ulcer status

	Pressure ulcer (%)				p
	No		Yes		
	n	%	n	%	
Age (years)	67 (22–90)		64 (38–80)		0.445
Gender					
Male	78	59.5	9	64.3	0.731
Female	53	40.5	5	35.7	
BMI (kg/m^2)	25.90 (15.60–46.80)		27.61 (22.22–48.44)		0.237
Smoking					
No	124	94.7	13	92.9	0.566
Yes	7	5.3	1	7.1	
Alcohol					
No	129	98.5	13	92.9	0.264
Yes	2	1.5	1	7.1	
Chronic disease					
No	26	19.8	3	21.4	1
Yes	105	80.2	11	78.6	
Hospitalization (day)	12 (1–65)		32 (14–42)		<0.001
Non-invasive (day)	3 (1–19)		21 (4–30)		0.016
Intubated (day)	5 (0–37)		15 (2–40)		0.013
NRS	6 (2–9)		6 (5–6)		0.720
GCS	15 (0–15)		15 (8–15)		0.689
Sedation (day)	4 (0–32)		15 (0–40)		<0.001
Albumin Average (g/dL)	26.14 (15.83–40.50)		22.90 (18.21–29.95)		0.008
Frequency (day)	3 (1–17)		4.50 (1–16)		0.728
APACHE II	21.35±10.52		21.79±5.43		0.803
Low albumin (g/dL)	21.63±5.73		17.55±4.24		0.011
Low Hgb (g/dL)	8.95±2.03		6.75±1.03		<0.001
Average Hgb (g/dL)	10.50±1.71		9.50±0.91		0.002
Breathing pattern					
extubated	41	31.3	1	7.1	<0.001
intubated	88	67.2	9	64.3	
Non-invasive	2	1.5	4	28.6	
Nutritional status					
Feeding	9	6.9	1	7.1	1
Not feeding	122	93.1	13	92.9	
Nutritional pattern					
Oral	32	26.2	0	0	0.038
Enteral	90	73.8	13	100	
Braden pressure sores risk					
Risk-free	38	29	0	0	0.003
Medium risk	21	16	0	0	
High risk	72	55	14	100	
Prone position					
Not applied	107	81.7	10	71.4	0.473
Applied	24	18.3	4	28.6	

Data were expressed as n, %, median (min-max), and mean±standard deviation. BMI: Body mass index; NRS: Nutritional risk screening; GCS: Glasgow coma scale; APACHE II: Acute physiology and chronic health evaluation II

Table 3. Demographic data and descriptive statistics of pressure ulcer-related variables in patients with pressure ulcers

	n	%		n	%
Age (year), mean±SD	61.29±14.05		Chronic disease		
BMI (kg/m^2), mean±SD	29.66±7.57		No	3	21.4
Hospitalization (day), mean±SD	28.85±8.64		Yes	11	78.6
Sedation (day), mean±SD	17.15±10.76		Breathing pattern		
Intubated (day), mean±SD	16.22±11.31		Extubated	1	7.1
Non-invasive (day), mean±SD	16.80±12.11		Intubated	9	64.3
APACHE II score, mean±SD	21.79±5.43		Non-invasive	4	28.6
GCS score, mean±SD	13±2.82		Prone position		
NRS, mean±SD	5.64±0.49		Not applied	10	71.4
Low albumin (gr/dL), mean±SD	17.55±4.24		Applied	4	28.6
Low Hgb (gr/dL), mean±SD	6.75±1.03		Nutritional status		
Albumin (gr/dL), mean±SD	23.48±2.88		Not feeding	1	7.1
Hgb (gr/dL), mean±SD	9.50±0.91		Feeding	13	92.9
Frequency of prone positioning (days), mean±SD	6.50±6.55		Nutritional pattern		
The day of the pressure ulcer, mean±SD	13.09±8.30		Oral	–	–
Gender			Enteral	13	100
Male	9	64.3	Prone positioning		
Female	5	35.7	Not applied	10	71.4
Smoking			Applied	4	28.6
No	13	92.9	Braden pressure sores risk		
Yes	1	7.1	Risk free	–	–
Alcohol			Medium risk	–	–
No	13	92.9	High risk	14	100
Yes	1	7.1	Restriction status		
			Not applied	–	–
			Applied	14	100

Categorical data were expressed as n, % and numerical data as mean±standard deviation. BMI: Body mass index; APACHE II: Acute physiology and chronic health evaluation II; GCS: Glasgow coma scale; NRS: Nutritional risk screening; Hgb: Hemoglobin; SD: Standard deviation

When Table 2 is examined, there is a statistically significant difference between the number of hospitalization days, non-invasive ventilation days, intubation days, and sedation days according to the presence of pressure ulcers (p<0.001, p=0.016, p=0.013, and p<0.001, respectively). As a result, the number of hospitalization days, non-invasive days, intubated days, and sedation days were found to be significantly higher in those patients with pressure ulcers compared to those without pressure ulcers. Low albumin, low Hgb, mean albumin, and mean Hgb values, which are among the laboratory parameters, had a statistically significant difference according to the presence of pressure ulcers (p=0.011, p<0.001, p=0.008, and p=0.002, respectively). These values were significantly lower in the patients with pressure ulcers compared to those without. There was a statistically significant difference according to the patients' breathing pattern, nutritional type, and pressure ulcers on the Braden Scale for Predicting Pressure Sore Risk (p<0.001, p=0.038, p=0.003, respectively). Accordingly, the majority of the patients with pressure ulcers were intubated, while those without pressure ulcers were mostly extubated. When the nutritional patterns were evaluated, all of the patients with pressure ulcers were fed enterally, while pressure ulcers did not occur in the patients who were fed orally. Considering the Braden Pressure Sores Risk, all patients with pressure ulcers were found to be at high risk, while 38 (29%) of the patients without pressure ulcers were at risk-free, 21 (16%) were at medium risk, and 72 (55%) were at high risk. When the prone positioning conditions are examined, it did not show a significant relationship between the prone position and the presence of pressure ul-

cers (p>0.05). The prone positioning frequency was applied as 4×3 or 3×4. Pressure ulcers occurred in four of the 28 patients who were given the prone position, and the pressure ulcer sites were sacrum, scapula, and chin. The other evaluated variables did not show a statistically significant difference according to the presence of pressure ulcers (p>0.05).

When the demographic characteristics of the patients with pressure ulcers are examined separately, the results are shown in Table 3.

DISCUSSION

There are many factors that affect pressure ulcer formation. In a systematic review that included 21 studies between 2002 and 2012 to determine pressure ulcer risk factors, 19 pressure ulcer risk factors were identified. Risk factors were reported as exposure of the site to pressure, anemia, low albumin level, circulatory deterioration, malnutrition and oxygenation, edema, advanced age, hyperthermia, prolonged immobilization, obesity, impaired sensory perception, smoking, and exposure to moisture.[19] Presence of infection, chronic diseases (hypertension, diabetes, etc.), impaired consciousness, and prolonged hospitalization are among the other factors.[17–19]

In this study, age, which is one of the risk factors, was not found to be associated with pressure ulcers. However, malnutrition, which increases with age, brings about changes in albumin and hemoglobin levels. Due to the interstitial edema caused by the decrease in albumin level, the tissue cannot be fed and waste products cannot be removed. On the other hand, the decrease in hemoglobin level facilitates wound development by causing insufficient oxygenation. In this study, it was observed that the rate of pressure ulcer development was higher in the patients with low blood albumin and hemoglobin levels. Therefore, to prevent pressure ulcers, nutrition should be regulated by closely monitoring albumin and prealbumin levels. To ensure tissue oxygenation, the hemoglobin level should also be kept within normal limits.[19,20]

As a result of the study, the mean APACHE II score of the patients was 21.39±10.12, and it was determined that there was no significant relationship between this score and pressure ulcer formation. In many previous studies, high APACHE II was shown as a risk factor for pressure ulcer development.[21,22]

As sedation duration increases in intensive care units, patients constantly lie in the same position and immobilization contributes to pressure ulcer formation. Prolonging the duration of artificial ventilation accelerates the formation of pressure ulcers, especially since positive pressure ventilation affects the circulation. In this study, there was a significant relationship between sedation duration (day), intubation time, intubation breathing pattern, and pressure ulcer formation, while pressure ulcers occurred in nine of the 88 intubated patients. This may be an indication that care is given by paying attention to protective measures.

In a study carried out in Wuhan,[23] while the average hospital stay in COVID-19 patients with pneumonia was 22 days, the average stay in the intensive care unit in our study was 28 days. In many studies, an increase in the length of stay in the hospital, especially in the intensive care unit, was stated as a risk factor for the formation of pressure ulcers.[17,23,24] In this study, a relationship was found between the duration of hospitalization and sedation days, and the formation of pressure ulcers. Since patients remain immobilized due to sedation, patients should be positioned regularly and frequently. In many studies examining pressure ulcers and related factors, immobilization and length of stay are among the factors that contribute to the formation of pressure ulcers.[12,13,25,26]

As a result of the study, although there was a significant relationship between the Braden pressure ulcer risk score and the pressure ulcer formation, pressure ulcers occurred in only 14 of the 86 high-risk patients. Unlike the results of this study, there was no significant relationship between pressure ulcer formation and the Braden pressure ulcer risk score in the studies of Fernandes and Caliri.[24]

Decreased position change in intensive care patients is effective in the development of pressure ulcers. It was shown in studies that long-term inactivity and limited activity were a risk factor for the development of pressure ulcers, as they cause high pressure to be applied to the same areas for a long time, thus disrupting the circulation in the skin and subcutaneous tissue.[12] In the study of Binda et al.,[27] it was found that 42.9% of the patients who were placed in the prone position had pressure ulcers, and that there was a significant relationship between the pressure ulcer and the number of days of mechanical ventilation and the duration of the prone position. In this study, 28.6% of the patients who were given the prone position had pressure ulcers, and while no significant relationship was found between the formation of pressure ulcers and the prone position, there was a significant relationship between the number of days in mechanical ventilation and the prone position. Considering the pressure ulcer sites of patients with pressure ulcers given the prone position, in the study of Ibarra et al.,[28] 18% occurred in the cheek, while in the study of Binda et al.,[27] 20.4% occurred in the sacrum and 16.7% occurred in the chin. The distribution of the anatomical regions in this study is in accordance with the literature, with 50% in the sacrum and 25% in the chin. Pressure ulcers on the

face occur especially on the forehead, chin, and cheekbones and can be explained as the pressure of the head due to the weight, decreased perfusion, and the lack of mass of the muscles that provide blood supply to the face.[10,27] As a result of the study, the rate of pressure ulcers developed in the patients given the prone position was lower than in similar studies and pressure ulcers occurred in different regions (sacrum and scapula), suggesting that pressure ulcer risk factors were determined and managed correctly in the institution, that appropriate nursing care interventions were applied to the patients, that the competencies of the nurses were at a good level, and that the appropriate nursing care delivery method was used.

As a result of the study, although there was no significant relationship between the presence of chronic disease and the formation of pressure ulcers, 11 of the 14 patients with pressure ulcers had chronic disease. In the patients, who developed pressure ulcers, five had diabetes, six had hypertension, one had chronic heart failure, and one had chronic kidney failure. In diseases affecting the circulatory system, such as diabetes, chronic heart failure, and hypertension, pressure ulcer formation can occur due to tissue perfusion failure and deterioration in oxygenation, while the healing process is prolonged.

The limitation of the study is that the data of the study were obtained only from the patients with a diagnosis of COVID-19 in the intensive care unit of a public hospital in Istanbul.

Obtaining the research data from the patients hospitalized in the intensive care unit of a public hospital in Istanbul is a limitation of the study, and cannot be generalized.

CONCLUSION

As a result of the study, it was found that the number of hospitalization days, non-invasive days, intubated days, and sedation days were significantly higher in the patients with pressure ulcers compared to those without pressure ulcers. The laboratory parameters of the albumin and hemoglobin values were found to be significantly lower in the patients with pressure ulcers compared to those without pressure ulcers. It was determined that the majority of the patients with pressure ulcers were intubated and that all patients with pressure ulcers were enterally fed and were at high risk according to the Braden Scale for Predicting Pressure Sore Risk. Nursing approaches are important in preventing pressure ulcer formation. Determination of pressure ulcer risk factors, prevention of wound formation, and planning/implementation of appropriate nursing interventions in case of wound development are among the duties, authorities, and responsibilities of nurses. Nurses should evaluate the pressure ulcer formation and risk factors of the patients that they care for with valid and reliable scales. With in-service training, nurses should be trained with guides and supported with up-to-date information. Evidence-based practices in accordance with care guidelines should be provided in clinics and should be made into institutional policy. In addition, in crisis situations, such as pandemics or disasters, ensuring that patients receive appropriate nursing care, keeping patient/nurse ratios at a level to ensure patient and employee safety, increasing the competencies of nurses, and determining appropriate nursing care delivery methods in cases where the need for competent nurses increases, and ensuring safe patient care should be one of the nursing services management policies of institutions.

Disclosures

Ethics Committee Approval: The study was approved by the Istanbul Kanuni Sultan Süleyman Training and Research Hospital Non-Pharmaceutical Clinical Research Ethics Committee (No: 47, Date: 20/04/2022).

Informed Consent: Written informed consent was obtained from all patients.

Peer-review: Externally peer reviewed.

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REFERENCES

1. World Health Organization. Coronavirus disease (COVID-19) pandemic. Available at: https://www.who.int/emergencies/diseases/novel-coronavirus-2019. Accessed Jan 19, 2023.
2. Chen N, Zhou M, Dong X, Qu J, Gong F, Han Y, et al. Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: A descriptive study. Lancet 2020;395:507–13.
3. Altın Z. Elderly people in Covid-19 outbreak. Journal of Tepecik Education and Research Hospital [Article in Turkish] 2020; 30(Suppl):49–57.
4. Akyar İ. Nursing management of acute respiratory distress syndrome (ARDS) in COVID-19 patients. JOHUFON [Article in Turkish] 2020;7(Supp):8–14.
5. Ghelichkhani P, Esmaeili M. Prone position in management of COVID-19 patients; a commentary. Arch Acad Emerg Med 2020;8:e48.
6. Mora-Arteaga JA, Bernal-Ramírez OJ, Rodríguez SJ. The effects of prone position ventilation in patients with acute respiratory distress syndrome. A systematic review and metaanalysis. Med Intensiva 2015;39:359–72. [CrossRef]

7. TC Sağlık Bakanlığı. COVID-19 (SARS-CoV-2 enfeksiyonu) erişkin hasta tedavisi. Ankara; 2022. Available at: https://covid19.saglik.gov.tr/Eklenti/43095/0/covid-19rehberieriskinhastayonetimivetedavi-12042022pdf.pdf. Accessed Jan 19, 2023.
8. Bloomfield R, Noble DW, Sudlow A. Prone position for acute respiratory failure in adults. Cochrane Database Syst Rev 2015;2015:CD008095.
9. Lucchini A, Bambi S, Mattiussi E, Elli S, Villa L, Bondi H, et al. Prone position in acute respiratory distress syndrome patients: A retrospective analysis of complications. Dimens Crit Care Nurs 2020;39:39–46.
10. NPIAP. Pressure Injury Stages. Available at: https://npiap.com/page/PressureInjuryStages. Accessed Jan 20, 2023.
11. EUAP, NPUAP, PPPIA. Prevention and treatment of pressure ulcers: Quick reference guide. 2014. Available at: https://www.epuap.org/wp-content/uploads/2010/10/Quick-Reference-Guide-DIGITAL-NPUAP-EPUAP-PPPIA-16Oct2014.pdf. Accessed Jan 20, 2023.
12. Çınar F, Kula Şahin S, Eti Aslan F. Evaluation of studies in Turkey on the prevention of pressure sores in the intensive care unit: A systematic review. BAUN Health Sci J [Article in Turkish] 2018;7:42–50. [CrossRef]
13. Posthauer ME, Banks M, Dorner B, Schols JM. The role of nutrition for pressure ulcer management: National pressure ulcer advisory panel, European pressure ulcer advisory panel, and pan pacific pressure injury alliance white paper. Adv Skin Wound Care 2015;28:175–88. [CrossRef]
14. Resmi Gazete. Hemşirelik Yönetmeliğinde Değişiklik Yapılmasına Dair Yönetmelik. Available at: https://www.resmigazete.gov.tr/eskiler/2011/04/20110419-5.htm, Accessed Jan 20, 2023.
15. Katran HB. The research on the incidence of pressure sores in a surgical intensive care unit and the risk factors affecting the development of pressure sores. JAREN [Article in Turkish] 2015;1:8–14. [CrossRef]
16. Tanrıkulu F, Dikmen Y. Pressure ulcers in intensive care patients: Risk factors and precautions. J Hum Rhythm [Article in Turkish] 2017;3:177–82.
17. Mollaoğlu M, Özkan Tuncay F, Kars Fertelli T. Investigation with Braden scale of pressure wound risk in the patients with cerebrovascular disease. FNJN [Article in Turkish] 2008;16:150–6.
18. Özdemir L. Usage of Scoring Systems in Intensive Care Units. JOHUFON [Article in Turkish] 2014;1:91–100.
19. Santos CT, Almeida Mde A, Oliveira MC, Victor MA, Lucena Ade F. Development of the nursing diagnosis risk for pressure ulcer. Rev Gaucha Enferm [Article in Portuguese] 2015;36:113–21. [CrossRef]
20. Tokgöz O, Demir O. Pressure ulcers incidence and risk factors in intensive care unit of norology. Selcuk Med J [Article in Turkish] 2010;26:95–8.
21. Ortaç Ersoy E, Öcal S, Öz A, Yılmaz P, Arsava B, Topeli A. Evaluation of risk factors for decubitus ulcers in intensive care unit patients. J Crit Intensive Care [Article in Turkish] 2013;4:9–12. [CrossRef]
22. Kıraner E, Kaya H. Pressure injuries in patients hospitalized in intensive care with the diagnosis of COVID-19 and retrospective analysis of risk factors. Journal of the Critical Care Nurses Society [Article in Turkish] 2021;25:139–151.
23. Cai Y, Chen Y, Xiao L, Khor S, Liu T, Han Y, et al. The health and economic impact of constructing temporary field hospitals to meet the COVID-19 pandemic surge: Wuhan Leishenshan Hospital in China as a case study. J Glob Health 2021;11:05023. [CrossRef]
24. Fernandes LM, Caliri MH. Using the Braden and Glasgow scales to predict pressure ulcer risk in patients hospitalized at intensive care units. Rev Lat Am Enfermagem 2008;16:973–8. [CrossRef]
25. Hug E, Ünalan H, Karamehmetoğlu ŞŞ, Tüzün Ş. Bir eğitim hastanesinde bası yarası prevelansı ve bası yarası gelişiminde etkili risk faktörleri. Türkiye Fiziksel Tıp ve Rehabilitasyon Dergisi [Article in Turkish] 2001;47.
26. Terekeci H, Kucukardali Y, Top C, Onem Y, Celik S, Oktenli C. Risk assessment study of the pressure ulcers in intensive care unit patients. Eur J Intern Med 2009;20:394–7. [CrossRef]
27. Binda F, Galazzi A, Marelli F, Gambazza S, Villa L, Vinci E, et al. Complications of prone positioning in patients with COVID-19: A cross-sectional study. Intensive Crit Care Nurs 2021;67:103088. [CrossRef]
28. Ibarra G, Rivera A, Fernandez-Ibarburu B, Lorca-García C, Garcia-Ruano A. Prone position pressure sores in the COVID-19 pandemic: The Madrid experience. J Plast Reconstr Aesthet Surg 2021;74:2141–8. [CrossRef]