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PRESSURE SORES IN INTUBATED PATIENTS HOSPITALIZED IN INTENSIVE CARE CLINICS; CROSS-SECTIONAL STUDY

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ABSTRACT

Pressure sores are one of the most important problems that slow down the healing process in bedridden and intubated patients. This study aimed to determine the incidence of pressure sores in intubated patients hospitalized in intensive care units and the factors affecting them. Patients newly hospitalized in the units where the study was conducted were included. Descriptive Information Form and Efteli-Güneş Pressure Sore Risk Assessment Scale were used in the study. The study included 54 intubated patients hospitalized in intensive care clinics of a state hospital. The rate of pressure sore development was 16.57%. When the patients were evaluated with the EFGU Pressure Sore Risk Assessment Scale, it was determined that the mean score of the scale was 8.50±1.14. It was determined that there was a statistically significant difference between the risk assessment scale total mean scores of patients who developed pressure sores and those who did not. This study showed that all intubated patients hospitalized in intensive care clinics were at risk for pressure sore development according to the Efteli-Güneş Pressure Sore Risk Assessment scale.

Key words: Intubated patients, Pressure sore, Pressure sore risk

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INTRODUCTION

Pressure sores, which disrupt the integrity of the skin, reduce the patient's quality of life, increase the risk of infection, and prolong hospitalization, are an important problem in terms of patient safety and one of the quality indicators of care (EPUAP, NPIAP, PPPIA, 2019). Pressure sores are wounds that usually occur in the areas of the body where bone protrusions are located due to impaired circulation due to prolonged or repetitive pressure (Esen et al., 2020). Pressure sores are widespread in areas of the body with bony protrusions, such as the coccyx, spine, hip, iliac bone, ankle, elbows, heels, and ear. In addition, pressure sores are more common in patients with severe acute failure, elderly individuals with limited mobility, and people with spinal cord injury (EPUAP, NPIAP, PPPIA, 2019). In the literature, there are studies that pressure sores are frequently seen in intensive care units (Gencer & Özkan, 2015; Katran, 2015). The incidence of pressure sores in intensive care units varies between 3 and 69% (Katran, 2015; Esen et al., 2020; Tokgöz & Demir, 2010).

Despite significant medical technology and nursing care advances in recent years, pressure sores are an important clinical problem. Studies conducted in various hospitals and hospital units in different countries have reported that the incidence of pressure sores reaches up to 56%. In studies conducted in our country, the incidence of pressure sores varies between 10 and 31% (Gönderen et al., 2023; Katran, 2015). In intensive care patients, this rate ranges from 14 to 56%. There is consensus that most, if not all, pressure sores are preventable and are a multifactorial problem (Cooper, 2017).

Intensive care units that aim to treat patients who need more comprehensive care and treatment due to

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cardiovascular insufficiencies, respiratory problems, trauma, burns, intoxications, cerebrovascular diseases, shock, bleeding-coagulation problems, mental status changes and multiorgan insufficiencies, have a special physical infrastructure, where vital indicators are monitored, patient follow-up and treatment are provided continuously on a 24-hour basis, equipped with advanced technology devices (Ministry of Health, 2015). Endotracheal intubation is an indispensable method to ensure airway control in intensive care units. Patients who are subjected to this method are given sedative drugs and compulsory bed rest in addition to other treatments. With immobilization, the risk of pressure sore formation increases due to the combination of the existing disease and other interventions used to treat the disease and muscle weakness (Kim, 2018).

In order to prevent the occurrence of pressure sores in nursing care, the first 8 hours after the patient is hospitalized in the intensive care unit, risk diagnostics should be performed. Pressure sore risk diagnostic scales evaluate the patient's risk of developing pressure sores by questioning many factors such as the patient's mobility status, skin structure, humidity, and comorbidities. Risk diagnostic scales alone are not sufficient in preventing pressure sores; nursing care should be provided to patients at risk, and this care should include practices such as mobilization, skin care, nutrition, and ensuring fluid-electrolyte balance (EPUAP, NPIAP, PPPIA, 2019).

This study aimed to determine the incidence of pressure sores in intubated patients hospitalized in intensive care units and the factors affecting them.

MATERIAL AND METHODS

Study Design and Setting

The research is descriptive and cross-sectional. Patients were evaluated with the EFGU (Efteli Güneş) Pressure Sore Risk Assessment Scale in the first 24 hours of admission and then continued to be followed up once a week. Patients were followed up until the development of pressure ulcers, discharge and death.

Study Population and Sample

The study population consisted of patients hospitalized in intensive care clinics between January 2024 and December 2024. In the population, 54 patients who met the inclusion criteria were included in the study. Inclusion criteria: Patients older than 18 years, without pressure sores, intubated, bedridden and hospitalized for at least six days. Exclusion criteria: Patients with pressure sores after admission to the hospital.

Data Collection

Descriptive Information Form and Efteli-Güneş Pressure Sore Risk Assessment Scale were used in the study.

Descriptive Information Form: The form includes 10 questions, including the patient's diagnosis, age, gender, date of hospitalization, pressure sore development, pressure sore stage, state of consciousness, presence of diabetes, hemoglobin value, and medications used.

Efteli-Güneş Pressure Sore Risk Assessment Scale: It was developed by Efteli and Güneş in 2020 to determine the risk of pressure sore formation in intensive care unit patients. The scale includes seven items: age, diastolic blood pressure, skin condition in the risk areas, discomfort and pain in the areas under pressure, skin tolerance test, incontinence, and the ability to make small weight changes in the areas under pressure. Each scale item has a score ranging from 0 to 3. Age and diastolic blood pressure were evaluated on a 0-1 point scale; skin condition in risk areas, discomfort and pain in areas under pressure and skin tolerance test were evaluated on a 0-2 point scale; incontinence and small weight change in areas under pressure were evaluated on a 0-3 point scale. The score range of the scale is 0-14, and a score of 6 and above indicates an increased risk of pressure sore development. The Cronbach's alpha coefficient of the scale is 0.81 (Efteli & Güneş, 2020).

Data Analysis

The data obtained from the study were analyzed using [e.g., IBM SPSS Statistics v25.0]. Continuous variables were presented as mean ± standard deviation, and categorical variables were expressed as numbers and percentages (%). The Chi-square (χ^2) test was used to compare categorical variables between groups. The Student's t-test was employed to compare continuous variables between two independent groups. A p-value of <0.05 was considered statistically significant

RESULTS

The mean age of intubated patients included in the study was 65.22±14.08 years. While 20.42% did not respond to painful stimuli, 79.6% responded. The mean length of stay in intensive care clinics was 12.92±6.73 days. The rate of pressure sore development was 16.57% (Table 1). When the patients were evaluated with the Efteli-

Table 1. Demographic characteristics of patients (n=54)

Gender n (%)	
Female	17 (% 31.5)
Male	37 (% 68.5)
Age (mean, SD)	65.22±14.08
Duration of stay (mean, SD)	12.92±6.73
Consciousness n (%)	
Response to painful stimulus	43 (% 79.6)
No response	11 (% 20.4)
Pressure Sore Development n (%)	9 (% 16.7)
Efteli-Güneş Scale score (mean, SD)	8.50±1.14
Efteli-Güneş Scale score (min-max)	6-11

Güneş Pressure Sore Risk Assessment Scale, it was determined that the mean score of the scale was 8.50±1.14. The lowest score was six, and the highest score was 11. The mean total score of the patients who developed pressure sores was 8.78± 0.99, while the mean score of those who did not was 7.81± 1.22. It was determined that there was a statistically significant difference between the risk assessment scale total mean scores of patients who developed pressure sores and those who did not (t=3.08, p<0.001) (Table 2).

In the study, it was determined that 58.8% of female patients and 75.7% of male patients developed pressure sores. There was no statistically significant difference between the development of pressure sores according to the gender of the patients (X2 = 1.587, p = 0.208) (Table 2). It was also determined that there was no difference between the pressure sore risk assessment scale scores of male and female patients (t=0.381p=0.705) (Table 3)

The mean age of the patients who developed pressure sores was 68.94±12.74 years, and the mean age of those who did not was 56.37±13.50 years. There was a statistically significant difference between the mean ages of the patients (t=3.254, p=0.002) (Table 2).

The mean hemoglobin value of the patients who developed pressure sores was 11.10±2.26 g/dl and 12.15±1.84 g/dl in patients who did not (reference value 11.7-15.5 g/dl). It was determined that there was no statistically significant difference between the patients' hemoglobin values and pressure sore development status (t=1.623, p=0.086) (Table 2).

In the study, it was determined that 76.2% of patients with diabetes and 66.7% of patients without diabetes developed pressure sores. There was no statistically significant difference between pressure sore development according to the presence of diabetes (X2 = 0.558, p=0.455) (Table 2), but patients with diabetes had higher pressure sore risk assessment scale scores (t=4.780, p = 0.003) (Table 3).

The study determined that 69% of patients with a diastolic blood pressure value of 60 mmHg and above and 75% of patients with a diastolic blood pressure value below 60 mmHg developed pressure sores. It was determined that there was no statistically significant difference between pressure sore development according to the

Table 2. Pressure ulcer development according to patients' demographic characteristics

	Developing pressure ulcers Mean (SD)	Not developing pressure ulcers Mean (SD)	Significance
Scale score*	8.78±0.99	7.81±1.22	T=3.08, p = 0.003
Age*	68.94±12.74	56.37±13.50	T =3.254, p = 0.002
Hemoglobin (mg/dl)*	11.10±2.26	12.15±1.84	T =1.623, p = 0.086
	n (%)	n (%)	
Gender**			X2 = 1.587, p = 0.208
Female	10(%58.8)	7 (41.2)	
Male	28 (%75.7)	9 (24.3)	
Diabetes**			X2 = 0.558, p = 0.455
Yes	16(%76.2)	5 (%23.8)	
No	22(%66.7)	11(%33.3)	
Diastolic Blood Pressure**			X2 = 0.690, p = 0.490
60 mmHg and above	29 (%69)	13 (%31)	
60 mmHg below	9 (%75)	3(%25)	

SD: Standard deviation. *Independent samples t-test. **chi-square test. Bold indicates a significant difference, p<0.05

Table 3. EFGU pressure ulcer risk assessment scale scores according to patients' demographic characteristics

	n (%)	Risk Assessment Scale Score Mean (SD)	Significance
Diabetes*			t = 4.780, p < 0.000
Yes	21 (%38.9)	9.28±0.902	
No	33 (%61.1)	8.00±1.00	
Diastolic Blood Pressure*			t = 5.823, p < 0.000
60 mmHg and Above	42 (%77.8)	8.11±0.967	
60 mmHg Below	12 (%22.2)	9.83±0.577	
Gender*			t = 0.381, p = 0.705
Female	17 (% 31.5)	8.41±1.227	
Male	37 (% 68.5)	8.5±1.120	

SD: Standard deviation. *Independent samples t-test. Significant difference p<0.05

diastolic blood pressure values of the patients (X2 = 0.690, p = 0.490) (Table 2). However, the pressure sore risk assessment scale scores of patients with diastolic blood pressure values below 60 mmHg were higher (t=4.780, p < 0.000) (Table 3).

DISCUSSION

In our study, the rate of pressure sore development in intubated patients hospitalized in intensive care clinics was 16.57%. In their systematic review, Cox (2017) reported that the prevalence for intensive care patients in the United States was 14.3%. A European study reported that the prevalence of pressure sores in intensive care units ranged between 14% and 42% (De Laat et al., 2006). In contrast, in a multicenter study conducted in Turkey, the prevalence of pressure sores was 11.43% (Sayan et al., 2020). When the studies conducted in intensive care clinics in Turkey were examined, it was found that this rate was 5.9% in the study by Gencer and Özkan (2015). The prevalence was determined to be 20.6% in a study conducted by Katran (2015) on patients hospitalized in surgical intensive care in a hospital. In a study by Kaşıkçı et al. (2018), it was reported that the prevalence of pressure sores in hospitals was 12.7%, while this rate was the highest prevalence, with 35.3% in intensive care clinics. Esen et al. (2020) found that pressure sores occurred in 3% of patients in the Reanimation ICU. Tokgöz and Demir (2010) found that pressure sores occurred in 15% of patients in the neurology ICU. Strazzieri-Pulido et al. (2019) found that the likelihood of pressure sores in intubated patients was 3.5 times higher. The rate of pressure sore development in our study, which included only intubated patients, is consistent with the literature.

A score of 6 or more on the scale indicates that the patient is at risk for pressure sores. In our study, it was determined that all intubated patients were at risk for pressure sore development. In addition, the mean total score of the patients who developed pressure sores was higher than that of those who did not. It is thought that immobility, the most significant factor in the development of pressure sores, together with the mandatory bed rest by giving sedative drugs to patients undergoing endotracheal intubation, increases the risk of pressure sores in all patients. In addition, the fact that most of the patients were over 65 years of age and had diabetes mellitus may have contributed to the increased risk.

Our study found no statistically significant difference between male and female intubated patients regarding pressure sore development. There are different results on whether gender is associated with pressure sores (Gönderen et al., 2023). This suggests that gender is not associated with pressure sore development and that gender should be presented as a demographic feature.

In our study, it was determined that the mean age of the patients who developed pressure sores was higher than that of the group who did not develop pressure sores. Advanced age is an important risk factor for pressure sore development (Anthony et al., 2019). Similar to our research results, studies have reported that advancing age is associated with pressure sore development (Olivo et al., 2020). Along with the deterioration in tissue perfusion and cognitive functions with advancing age, restricting the movement of the intubated patient with sedation also increases the risk of pressure sore development by increasing the adverse effects of pressure (Anthony et al., 2019; Çavuşoğlu et al., 2020; EPUAP, NPIAP, PPPIA, 2019; Ersoy et al., 2013; Sayan et al., 2020).

When the hemoglobin level falls below 12 g/dl, tissue resistance and oxygen-carrying capacity of the blood decrease severely, and ischemia develops. If ischemia is accompanied by anemia, cell metabolism is at greater risk. Low hemoglobin level is reported to increase the risk of pressure sores (Fogerty et al., 2008). A hemoglobin level of less than 10 g/dl facilitates the development of pressure sores and makes healing difficult (Ersoy et al., 2013). In the study, it was determined that the hemoglobin values of the patients did not affect the development of pressure sores. However, this value was lower in patients who developed pressure sores. Similar to our findings, studies in the literature show that low hemoglobin values do not affect the development of pressure sores (Tokgöz & Demir, 2010; Tsaras et al., 2016).

Our study determined that diabetes and diastolic blood pressure values did not affect pressure sore development. However, although all patients were in the risk group, pressure sore risk scores were higher in patients with diabetes and diastolic blood pressure values below 60 mmHg. Especially in patients with pressure sores, diabetes causes delay in wound healing (Knudsen & Tonseth, 2011). A study found that the risk of pressure sores in patients with diabetes was higher than in patients without diabetes (Onigbinde et al., 2012). It has been reported that patients with hypotension, especially those with diastolic blood pressure values below 60 mmHg, are more at risk for pressure sore development (Edsberg et al., 2014). The study conducted by Lindgren et al. (2004) determined that pressure sore development was higher in patients with lower diastolic blood pressure values.

The limitation of this study is that it was conducted in a single center with a limited number of patients.

CONCLUSION

This study showed that all intubated patients hospitalized in intensive care clinics were at risk for pressure sore development according to the Efteli-Güneş Pressure Sore Risk Assessment scale developed specifically for intensive care clinics, that pressure sores develop more frequently in intubated patients, and that different factors contribute to this development. In intensive care clinics, it is critical to identify risk factors and take additional protective measures to prevent pressure sores, especially in intubated patients with restricted movement.

ETHICAL APPROVAL

This study was conducted according to the Declaration of Helsinki. The ethical approval was obtained from the Burdur Mehmet Akif Ersoy University's Non-Interventional Research Ethics Committee (Date: 06.10.2021 Number: GO 2021/341).

AUTHOR CONTRIBUTIONS

The design and conduct of the study, data collection, analysis, and drafting of the article were done by E. Efteli.

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CONFLICT OF INTEREST

The author declare no conflict of interest during the research and publication phase.

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REFERENCES

Anthony, D., Alosoumi, D., & Safari, R. (2019). Prevalence of pressure ulcers in long-term care: A global review. Journal of Wound Care, 28(11), 702–709. https://doi.org/10.12968/jowc.2019.28.11.702

Cooper, K. L. (2013). Evidence-based prevention of pressure ulcers in the intensive care unit. Critical Care Nurse, 33(6), 57–66. https://doi.org/10.4037/ccn2013985

Cox, J. (2017). Pressure injury risk factors in adult critical care patients: A literature review. Ostomy/Wound Management, 63(11), 30–43. https://doi.org/10.1097/01.ASW.0000534699.50162.4e

Çavuşoğlu, A., Yeni, K., İncekara, H., Acun, A., Polat Dünya, C., & Tülek, Z. (2020). Prevalence of pressure ulcers in an intensive care unit: A retrospective study. JAREN, 6(2), 203–209. https://doi.org/10.5222/jaren.2020.36854

De Laat, E. H. E. W., Schoonhoven, L., Pickkers, P., Verbeek, A. L. M., & van Achterberg, T. (2006). Epidemiology, risk, and prevention of pressure ulcers in critically ill patients: A literature review. Journal of Wound Care, 15(6), 269–275. https://doi.org/10.12968/jowc.2006.15.6.26920

Edsberg, L. E., Langemo, D., Baharestani, M. M., Posthauer, M. E., & Goldberg, M. (2014). Unavoidable pressure injury: State of the science and consensus outcomes. Journal of Wound Ostomy & Continence Nursing, 41(4), 313–334. https://doi.org/10.1097/WON.0000000000000050

Efteli, E., & Güneş, Ü. (2020). Assessing the validity and reliability of a new pressure ulcer risk assessment scale for patients in intensive care units. Wound Management & Prevention, 66(2), 24–33. https://doi.org/10.25270/wmp.2020.2.2433

Ersoy, E. O., Öcal, S., Öz, A., Yılmaz, P., Arsava, B., & Topeli, A. (2013). Evaluation of risk factors that may play a role in developing pressure ulcers in intensive care patients. Intensive Care Journal, 4, 9–12. https://jcritintensivecare.org/storage/upload/pdfs/1709374569-tr.pdf

Esen, H., Aykal, G., & Özbek, C. (2020). Evaluation of pressure ulcers in intensive care units: An example of a training and research hospital. Journal of Performance and Quality in Healthcare, 17(2), 183–202. https://dergipark.org.tr/tr/download/article-file/1023362

European Pressure Ulcer Advisory Panel, National Pressure Injury Advisory Panel, & Pan Pacific Pressure Injury Alliance. (2019). Prevention and treatment of pressure ulcers/injuries: Quick reference guide (E. Haesler, Ed.). EPUAP/NPIAP/PPPIA. https://www.epuap.org/pu-guidelines/#2014qrgtranslation

Fogerty, M. D., Abumrad, N. N., Nanney, L., Arbogast, P. G., Poulose, B., & Barbul, A. (2008). Risk factors for pressure ulcers in acute care hospitals. Wound Repair and Regeneration, 16(1), 11–18. https://doi.org/10.1111/j.1524-475X.2007.00327.x

Gencer, Z. E., & Özkan, Ö. (2015). Pressure ulcers surveillance report. Journal of Turkish Intensive Care Society, 13, 26–30. https://doi.org/10.4274/tybdd.81300

Gönderen, K., Gönderen, A., Simavlıoğlu, G., & İdil, D. (2023). Comparison of patients with pressure ulcers at admission to the intensive care unit and those who developed pressure ulcers during hospitalization. Ankara Education and Research Hospital Medical Journal, 56(3), 178–181. https://doi.org/10.20492/aeahtd.738260

Kaşıkçı, M., Aksoy, M., & Ay, E. (2018). Investigating the prevalence of pressure ulcers and patient-related risk factors in hospitals in the province of Erzurum: A cross-sectional study. Journal of Tissue Viability, 27(3), 135–140. https://doi.org/10.1016/j.jtv.2018.05.001

Katran, H. B. (2015). The research on the incidence of pressure sores in a surgical intensive care unit and the risk factors affecting the development of pressure sores. Journal of Academic Research in Nursing, 1(1), 9–13. https://doi.org/10.5222/jaren.2015.008

Kim, D. (2018). Rehabilitation and intensive care unit. Acute and Critical Care, 33(1), 43–45. https://doi.org/10.4266/acc.2018.00080

Knudsen, C. W., & Tønseth, K. A. (2011). Pressure ulcers–prophylaxis and treatment. Tidsskrift for Den Norske Legeforening, 131, 464–467. https://doi.org/10.4045/tidsskr.09.1472

Lindgren, M., Unosson, M., Fredrikson, M., & Ek, A. C. (2004). Immobility–a major risk factor for development of pressure ulcers among adult hospitalized patients: A prospective study. Scandinavian Journal of Caring Sciences, 18(1), 57–64. https://doi.org/10.1046/j.0283-9318.2003.00250.x

Ministry of Health of the Republic of Türkiye. (2015). Communiqué on amendments to the communiqué on the application procedures and principles of intensive care services in inpatient healthcare facilities. Official Gazette, Number: 29447. https://www.mevzuat.gov.tr/mevzuat?MevzuatNo=15146&MevzuatTur=9&MevzuatTertip=5

Olivo, S., Canova, C., Peghetti, A., Rossi, M., & Zanotti, R. (2020). Prevalence of pressure ulcers in hospitalised patients: A cross-sectional study. Journal of Wound Care, 29(3), S20–S28. https://doi.org/10.12968/jowc.2020.29.Sup3.S20

Onigbinde, A., Ogunsanya, G. I., & Oniyangi, S. O. (2012). Pressure ulcer incidence among high-risk inpatients in Nigeria. British Journal of Nursing, 21(12), S4–S10. https://doi.org/10.12968/bjon.2012.21.Sup12.S4

Sayan, H. E., Girgin, N. K., & Asan, A. (2020). Prevalence of pressure ulcers in hospitalized adult patients in Bursa, Turkey: A multicentre, point prevalence study. Journal of Evaluation in Clinical Practice, 26(6), 1669–1676. https://doi.org/10.1111/jep.13354

Strazzieri-Pulido, K. C., González, C. V. S., Nogueira, P. C., Padilha, K. G., & Santos, V. L. G. (2019). Pressure injuries in critical patients: Incidence, patient-associated factors, and nursing workload. Journal of Nursing Management, 27(2), 301–310. https://doi.org/10.1111/jonm.12671

Tokgöz, O. S., & Demir, O. (2010). Pressure ulcer incidence and risk factors in neurology intensive care unit. Selcuk University Medical Journal, 26(3), 95–98. https://www.selcukmedj.org/uploads/publications/SUTD-35.pdf

Tsaras, K., Chatzi, M., Kleisiaris, C. F., Fradelos, E. C., Kourkouta, L., & Papathanasiou, I. V. (2016). Pressure ulcers: Developing clinical indicators in evidence-based practice. A prospective study. Medical Archives, 70(5), 379–383. https://doi.org/10.5455/medarh.2016.70.379-383