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The risk levels of pressure ulcer among critically ill patients in the Intensive Care Unit (ICU): A survey study

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Abstract

Introduction: Pressure ulcers represent a significant global challenge, associated with increased mortality, morbidity, healthcare expenses, and extended stays in the Intensive Care Unit (ICU). This issue reflects the persistent prevalence of pressure ulcers, often compared to an iceberg phenomenon, as they continue to exist year after year.
Objectives: The primary objective of this study is to evaluate the risk levels of pressure ulcers among critically ill patients at the Yarsi West Sumatra Hospital in 2024.
Methods: This research utilizes a quantitative design, focusing on all patients admitted to the ICU. An infinite population sampling technique was employed, resulting in a total sample size of 97 respondents.
Results: The findings revealed that the most prevalent age group among respondents was between 55 and 70, comprising 39 individuals (40.2%). Most respondents were female, totaling 54 individuals (55.7%). The length of hospital stay most commonly reported was 2 days, with 52 respondents (53.6%) falling into this category.
Conclusions: An analysis of pressure ulcer risk levels indicates that less than half of the critically ill patients are at high risk for developing pressure ulcers, with 40 respondents (41.2%) identified in this category. Conversely, most 57 respondents (58.8%) are at low risk for developing pressure ulcers.

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1. Introduction

Critical patients are characterised by a state of physiological instability or dysfunction affecting one or more body systems, which can lead to pain, disability (morbidity), or even death (mortality) within a very short timeframe, often just minutes or hours. Typically, these patients have undergone physiological damage, though the early warning signs are frequently overlooked. The severity of a patient's illness directly correlates with their vulnerability, instability, and the complexity of their condition, necessitating intensive and vigilant care.

Patients in critical condition require continuous monitoring and immediate intervention to prevent further physiological deterioration (Ministry of Health of the Republic of Indonesia, 2016). They often exhibit various vulnerabilities, including helplessness and weakness,

resulting in reliance on assistive devices, which further heightens their risk of complications. Consequently, these patients are frequently situated in the Intensive Care Unit (ICU), where close monitoring and specialised care are essential.

In the ICU, patients face an increased risk of developing pressure sores due to prolonged bed rest, limited mobility, and altered levels of consciousness. According to Potter and Perry (2020), the adverse effects of bed rest can compromise skin integrity, leading to irritation and the formation of pressure sores. According to the National Pressure Ulcer Advisory Panel (NPUAP), pressure ulcers are localised lesions typically forming around bony prominences due to pressure or a combination of pressure, shear or frictional forces. These ulcers can cause damage to the underlying tissue, affecting approximately 3 million people worldwide each year (Parvizi et al., 2023). Studies indicate a persistently high prevalence of pressure ulcers, particularly among hospitalised patients, where the incidence varies globally from 1% to 56%. Reports show notable prevalence rates in intensive care units (ICUS), including 49% in Europe, 22% in North America, and 50% in Australia. In Indonesia, the incidence of pressure ulcers among ICU patients reaches 33%, considerably higher than the range of 2.1% to 31.3% reported for Southeast Asia (Ahdiyat et al., 2022). Furthermore, the incidence of pressure injuries in intensive care units is 9.6%, compared to only 2.1% in non-intensive care units (Fullbrook et al., 2023).

Prolonged bed rest can lead to skin pressure, impacting the soft tissue around bony prominences (Romanelli et al., 2018). Pressure ulcers can cause severe pain, physical and psychological discomfort, limitations in daily activities, extended hospitalisation, increased treatment costs, and even mortality (Zuo & Meng, 2015). Risk factors for developing pressure ulcers include nutritional status, skin moisture, increasing age, and perfusion and oxygenation. Preventing pressure ulcers is crucial for patients with limited mobility (Potter & Perry, 2006). Accurately assessing the risk of pressure ulcers is essential for nurses to determine and implement appropriate preventive interventions (Kottner, 2009).

The Cubbin-Jackson assessment tool is effective in evaluating critically ill patients' condition compared to the Braden Scale (Hyun et al., 2019; Jackson, 1999). This scale assesses pressure ulcer risk in European critical care units (Cooper, 2013). Explicitly developed for ICU patients, the Cubbin-Jackson Scale (Boyle & Green, 2001 in Eunkyung et al., 2013) consists of ten criteria: age, weight, skin condition, mental condition, mobility, nutrition, breathing, incontinence, cleanliness, and hemodynamic state. The total score ranges from 1 to 40, with each subscale scored 1 to 4. The scale has a sensitivity of 95%, specificity of 81.5%, and a positive predictive value of 28% (Marasso, 1996; Zweig & Campbell, 1993).

RSI Ibnu Sina Payakumbuh is a type C referral hospital that continuously improves its services yearly. According to medical record data from RSI Ibnu Sina Payakumbuh, the number of ICU patient visits in 2023 was 595, while RSI Ibnu Sina Bukittinggi reported 673 visits. An initial survey conducted in the RSI Ibnu Sina Payakumbuh ICU found that most critically ill patients on bed rest were at an increased risk for pressure ulcers, with 4 out of 6 patients exhibiting various risk factors. This situation negatively impacts the speed of patient recovery. Accurate measurement of pressure ulcer risk can help evaluate the effectiveness of interventions, allowing for better prediction and prevention of pressure ulcers in ICU patients. Researchers are interested in conducting a study titled "Assessment of Pressure Ulcer Risk Levels in Critical Patients in the ICU at Yarsi Hospital, West Sumatra, in 2024."

2. Methods

2.1. Research design

This research presents a quantitative study that employed a cross-sectional descriptive design. It utilises a survey method to evaluate the risk levels of pressure ulcers in critically ill patients within the Intensive Care Unit (ICU). In a cross-sectional design, data is collected at a specific time without interventions, rendering the findings representative of the existing conditions. The study employs the Cubbin & Jackson Scale, a validated tool for assessing the risk of pressure injuries in critically ill patients based on ten clinical indicators and nursing conditions.

2.2. Setting and samples

This study was conducted in the Intensive Care Unit (ICU) of Yarsi Hospital in West Sumatra Province.

The study included all patients treated in the ICU during the specified period. Samples were collected using a purposive sampling technique, customised for the unique conditions of the study. A total of 97 patients were included based on the following inclusion criteria: patients aged 18 years and older, those treated in the ICU for at least 24 hours, and patients with complete and accessible medical records.

2.3. Measurements and data collection

The primary tool used in this study was the Cubbin & Jackson Scale, which assesses the risk of pressure ulcers based on several factors, including:

- Hemodynamic status
- Mechanical ventilation
- Mobility
- Nutrition
- Consciousness status
- Skin condition

Each factor is assigned a score, and the total score indicates the level of risk for pressure ulcers: lower scores suggest a higher risk, while higher scores indicate a lower risk.

Data collection was conducted through various methods, including:

- Direct observations by research nurses
- Reviews of medical records to supplement clinical information
- Completing a standardised assessment form based on the Cubbin & Jackson Scale during data collection.

2.4. Data analysis

The collected data were analysed using descriptive quantitative methods. This analysis aimed to describe the frequency distribution and percentage of pressure ulcer risk levels according to the Cubbin & Jackson score. The results are presented in a distribution table that categorises the data based on risk levels, distinguishing between low-risk and higher-risk categories.

3. Results

3.1. Frequency distribution of pressure Ulcer Risk among Critical Patients in the ICU of Yarsi Hospital, West Sumatra, in 2024

Table 1. Frequency distribution of pressure Ulcer Risk among Critical Patients in the ICU of Yarsi Hospital, West Sumatra, in 2024 (N: 97)

Characteristics	Category	F	%
Pressure Ulcer Risk	High Risk	40	41,2
	Low Risk	57	58,8
	TOTAL	**97**	**100**

The study results indicate that less than half of the critical patients at high risk developed pressure ulcers, with 40 respondents (41.2%) affected. In contrast, more than half of the critical patients at low risk experienced pressure ulcers, totalling 57 respondents (58.8%).

4. Discussion

This study examined the distribution of pressure injury risk categories among critically ill patients using the Cubbin and Jackson scale. It also identified key clinical characteristics that influence these risk levels. The findings reveal that many patients were classified in the low-risk category. This classification was mainly attributed to several factors: a younger age (under 40 years, 13.4%), intact skin (57.7%), a conscious mental state (39.2%), and limited but present mobility (40.2%). These characteristics are associated with improved tissue perfusion and reduced mechanical stress on areas prone to pressure injuries, ultimately resulting in a lower risk of developing such injuries.

Our research findings support the recent study by Karacabay et al. (2023), which highlights an important relationship between patient hemodynamic status and the incidence of pressure injuries in the ICU. Their investigation found that patients with higher Cubbin and Jackson scores, indicative of better hemodynamic stability and functional performance, experienced a significantly lower occurrence of pressure injuries than those with lower scores.

Additionally, a related study by Yang et al. (2024) tested the effectiveness of the Cubbin and Jackson scale against the Waterlow scale. Their analysis demonstrated that the Cubbin and Jackson scale predicted the risk of pressure injuries more accurately and achieved a notable area under the curve (AUC) of 0.859. This superior predictive accuracy underscores the scale's effectiveness in identifying high-risk and low-risk ICU patients. It highlights its value in clinical practice, where early intervention can help prevent pressure injuries. These findings suggest that using the Cubbin and Jackson scoring system may enhance patient care by enabling more targeted and timely preventative measures in critical care environments.

Many patients (40 out of 97) were identified as high risk. This categorization was primarily based on several factors, including older age groups (specifically those over 70 years and those between 55 and 70 years), impaired skin integrity (such as erythema, abrasions, and necrosis), reduced consciousness (including conditions like coma and apathy), being bedridden (22.7%), respiratory distress (38.1%), and complete dependency for hygiene (48.5%). The literature consistently highlights these factors as critical contributors to developing pressure injuries in critically ill patients.

This finding aligns with comprehensive research conducted by Higgins et al. (2020), highlighting significant risk factors associated with developing pressure injuries in critically ill patients. The study specifically noted that patients who have impaired consciousness, require mechanical ventilation, and have limited mobility are considerably more susceptible to these injuries. In a comparative analysis, the Cubbin and Jackson scale demonstrated superior

predictive accuracy for this vulnerable population compared to the more widely known Braden scale (Higgins et al., 2020). This suggests that the Cubbin and Jackson scale may be more effective for assessing risk in ICU settings.

Additionally, Sönmez (2023) emphasised that pressure injuries can result from intrinsic factors related to the patient's condition, such as age, skin integrity, and overall health status, and extrinsic factors, particularly the medical devices used in their care. This duality underscores the critical need for routine and targeted assessments considering patient characteristics and device-related risks within the ICU environment (Sönmez, 2023).

The current study further reinforces the existing body of evidence, indicating that various factors—including age, skin condition, level of consciousness, mobility, hemodynamic status, respiratory function, and nutritional dependence—are reliable indicators for assessing the risk of pressure injuries. The Cubbin and Jackson scale thoroughly examines and effectively captures all these factors. The findings strongly support its ongoing use as a clinically reliable and sensitive tool for risk stratification in ICU settings. This validation is further supported by Adibelli and Korkmaz (2019), who reported impressive sensitivity (87%) and specificity (84%) for the scale, establishing its utility in enhancing patient care and preventing pressure injuries in critically ill patients (Adibelli & Korkmaz, 2019).

5. Implication and limitations

The findings of this study carry important clinical implications for preventing pressure injuries in critical care settings. The Cubbin and Jackson scale effectively identifies high-risk ICU patients using a range of criteria, including age, level of consciousness, mobility, skin condition, and respiratory and hemodynamic status. By utilising this validated tool for early risk identification, healthcare providers can implement targeted nursing interventions such as repositioning schedules, pressure-relieving surfaces, improved nutritional support, and increased skin surveillance. Incorporating structured risk assessments into routine ICU practice may help reduce morbidity, shorten hospital stays, and lower healthcare costs associated with hospital-acquired pressure injuries.

However, this study has several limitations. Firstly, it employed a cross-sectional design, which restricts the ability to evaluate the progression of pressure injuries over time. Secondly, the research was conducted at a single centre, potentially affecting the generalizability of the results. Thirdly, while the Cubbin and Jackson scale is designed explicitly for ICU patients, the study did not compare it with other assessment tools, such as the Braden scale, which could have provided additional validation. Furthermore, some clinical variables were not analysed, such as nutritional biomarkers and staff compliance with prevention protocols.

6. Conclusion

This study demonstrated that the Cubbin and Jackson scale is an effective and practical tool for assessing the risk of pressure injuries in critically ill patients. The scale effectively captures multiple factors contributing to the risk of pressure ulcers, particularly advanced age, altered consciousness, immobility, and impaired skin integrity. These findings support the routine use of the Cubbin and Jackson scale in ICU nursing practice to facilitate early identification and prevention strategies. Future longitudinal studies across multiple centres are recommended to validate and expand upon these findings.

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Authors Contribution

Author 1 (FYEP): Conceptualized the study, designed the methodology, and led data collection in the ICU setting.
Author 2 (RC): Performed data analysis, interpretation of results, and drafted the initial manuscript.
Author 3 (JSR): Conducted the literature review, assisted with formatting, and revised the manuscript critically for important intellectual content.
All authors have read and approved the final version of the manuscript and agree to be accountable for all aspects of the work.

Conflict of interest

There is no conflict of interest in this study.

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