

Original article

Knowledge and competence of nurses and prevalence of pressure ulcers in stroke patients

**Verica Petrović^{1,2}, Anes Budimlić³,
Kosana Stanetić^{1,2}, Suzana Savić^{1,2},
Gordana Tešanović^{1,2}**

¹University of Banja Luka,
Faculty of Medicine, Banja Luka,
Republic of Srpska,
Bosnia and Herzegovina

²Public Health Institution of
Republic of Srpska,
Health Center Banja Luka,
Republic of Srpska,
Bosnia and Herzegovina

³University of Bihać,
Islamic Pedagogical Faculty, Bihać,
Bosnia and Herzegovina

Primljen – Received: 21/07/2025
Prihvaćen – Accepted: 03/12/2025

Corresponding author:

Verica Petrović, MD, PhD
Zdrave Korde 4, 78000 Banja Luka
e-mail: verica.petrovic@med.unibl.org

Copyright: ©2025 Verica Petrović et al. This is an Open Access article distributed under the terms of the Creative Commons Attribution 4.0 International (CC BY 4.0) license.

Summary

Introduction. Pressure ulcers are frequent complications among immobile neurological patients, particularly those with stroke. Nursing knowledge and consistent implementation of preventive measures play a crucial role in reducing their occurrence. The aims of this study are to assess nurses' knowledge, attitudes and self-reported competence in pressure ulcer prevention and care, and to describe the prevalence and short-term healing outcomes of pressure ulcers among hospitalized stroke patients.

Methods. A descriptive cross-sectional study was conducted among 40 nurses/medical technicians using a structured, non-validated questionnaire. Medical records of 375 consecutively hospitalized patients with ischemic or hemorrhagic stroke were reviewed to determine the occurrence and management of pressure ulcers.

Results. Nurses demonstrated good knowledge of fundamental preventive principles, although gaps were identified in epidemiology and recognition of certain complications. Pressure ulcers were documented in both ischemic and hemorrhagic stroke patients, with an overall prevalence of 5.1%. Conservative treatment was most frequently applied, and most ulcers were recorded as healed at discharge.

Conclusion. Nursing knowledge appears generally adequate, but specific gaps indicate the need for targeted educational interventions. Interpretation of prevalence and outcomes is limited by the absence of validated assessment instruments and standardized documentation.

Key words: pressure ulcers, stroke, nursing knowledge, prevention, wound care, prevalence

Introduction

Pressure ulcers are localized injuries of the skin and underlying tissues that develop as a result of sustained pressure, shear forces or friction, most commonly over bony prominences. Their

development is associated with impaired microcirculation, reduced oxygen delivery and tissue ischemia, which may progress to necrosis if early changes are not recognized and treated appropriately [1, 2]. In addition to mechanical factors, intrinsic and extrinsic conditions such as immobility, moisture, impaired sensation, malnutrition and altered level of consciousness increase susceptibility to tissue damage [3].

Patients hospitalized with stroke represent a particularly vulnerable population. Neurological deficits including hemiparesis, paralysis, sensory disturbances and reduced alertness frequently lead to prolonged immobility and dependence on nursing care. Consequently, stroke patients are at increased risk of developing pressure ulcers during hospitalization.

International clinical guidelines emphasize early identification of risk, regular skin assessment, appropriate repositioning schedules, adequate nutrition and hydration, and the use of pressure-relieving surfaces as essential preventive strategies in this population [4]. Nurses play a central role in implementing these measures, and their knowledge and competence directly influence patient outcomes.

Assessment of nurses' knowledge and evaluation of pressure-ulcer occurrence among stroke patients provide important insight into quality of care and patient safety. Therefore, the aims of this study were to assess nurses' knowledge and competence related to pressure-ulcer prevention and to describe the prevalence and short-term outcomes of pressure ulcers among hospitalized stroke patients.

Methods

Study design and setting

A descriptive cross-sectional study was conducted at the Neurology Department of the Cantonal Hospital in Bihać, Bosnia and Herzegovina, from July 2021 to June 2022. The

study consisted of two components: assessment of nurses' knowledge and attitudes, and descriptive analysis of pressure-ulcer occurrence among hospitalized stroke patients.

Participants

Nurses

Forty nurses/medical technicians employed at the department participated voluntarily. Inclusion criteria were direct involvement in bedside patient care and at least six months of work experience.

Patients

Medical records of 375 consecutively hospitalized patients diagnosed with ischemic or hemorrhagic stroke were reviewed.

Instrument and data collection

Nurses' knowledge and attitudes were assessed using a structured, non-validated questionnaire developed for this study and based on educational materials and international guidelines for pressure-ulcer prevention and care [5, 6]. The questionnaire consisted of three sections: (1) socio-demographic and professional characteristics, (2) attitudes toward pressure-ulcer prevention and management assessed using a five-point Likert scale, and (3) knowledge assessment comprising 34 items related to etiology, complications and preventive measures.

Patient data extracted from medical records included stroke type, presence of pressure ulcers, applied treatment modality (conservative or surgical) and healing status at discharge. Standardized risk-assessment tools and formal ulcer staging systems were not routinely documented.

Data analysis

Data were analyzed descriptively using absolute numbers and percentages. No inferential statistical tests were applied.

Results

Nurses' socio-demographic characteristics and attitudes

A total of 40 nurses/medical technicians participated in the study. Most participants had more than 10 years of professional experience, and nearly half held a higher vocational or university degree. Formal education and internal institutional training were the most frequently reported sources of knowledge related to pressure-ulcer prevention. The majority of nurses reported daily contact with patients affected by pressure ulcers (Table 1).

Table 1. Socio-demographic and professional characteristics of nurses (N = 40)

Characteristic	n	%
Education level		
Secondary medical school	21	52.5
Higher/University degree	19	47.5
Years of experience		
< 5 years	4	10.0
5–10 years	6	15.0
10–20 years	15	37.5
> 20 years	15	37.5
Source of knowledge		
Formal education	23	57.5
Internal training	10	25.0
Self-learning/courses	7	17.5
Daily contact with patients with pressure ulcers		
Yes	34	85.0
No	6	15.0

Overall, nurses expressed predominantly positive attitudes toward pressure-ulcer prevention and management. Most respondents considered themselves competent in providing pressure-ulcer care and strongly emphasized the importance of preventive measures. A large proportion of participants indicated the need for improved availability of wound-care materials, better communication between physicians and nurses, and the establishment of a regional wound-care center (Table 2).

Table 2. Nurses' attitudes toward the prevention and management of pressure ulcers

Statement	n	%
I consider myself competent in pressure-ulcer care	36	90.0
Preventive measures are essential for pressure-ulcer prevention	39	97.5
Availability of materials for wound care should be improved	36	90.0
Better communication between physicians and nurses is needed	33	82.5
A regional wound-care center is needed	37	92.5

Nurses' knowledge of pressure ulcers

High proportions of correct responses were observed for fundamental preventive and care-related principles. Nearly all nurses correctly identified early skin redness as the first sign of pressure-ulcer development and recognized regular patient repositioning as a key preventive measure. Good knowledge was also demonstrated regarding the role of skin hygiene, moisture control and the importance of prevention over treatment.

Lower levels of correct responses were noted in relation to epidemiological aspects of pressure ulcers, particularly their occurrence during long-term hospitalization. In addition, a proportion of nurses incorrectly associated pressure ulcers with muscle spasms, indicating gaps in the recognition of specific complications (Table 3).

Table 3. Key indicators of nurses' knowledge on pressure ulcers

Knowledge domain	Correct responses (%)
Recognition of early signs (skin redness)	97.5
Importance of regular patient repositioning	100.0
Role of moisture and skin hygiene	90.0
Prevention is more important than treatment	85.0
Awareness of potential complications (infection, sepsis)	85.0
Knowledge of epidemiology during long-term hospitalization	40.0

*Note. The knowledge assessment instrument was non-validated; results are presented descriptively only.

Prevalence and management of pressure ulcers among stroke patients

Among the 375 consecutively hospitalized stroke patients included in the analysis, pressure ulcers were documented in 19 cases, corresponding to an overall prevalence of 5.1%. Pressure ulcers occurred in patients with both ischemic and hemorrhagic stroke. The number and proportion of affected patients according to stroke type are presented in Table 4.

Table 4. Prevalence of pressure ulcers among stroke patients (N = 375)

Type of stroke	Total number of patients	Patients with pressure ulcers n (%)
Ischemic stroke	170	7 (4.1)
Hemorrhagic stroke	205	12 (5.9)
Total	375	19 (5.1)

Regarding management, conservative treatment was the most frequently applied therapeutic approach, while surgical intervention was required in a smaller number of cases. At the time of discharge, the majority of pressure ulcers were recorded as healed. Treatment modalities and short-term outcomes are summarized in Table 5.

Table 5. Treatment outcomes of pressure ulcers during hospitalization (N = 19)

Treatment modality	Number of patients	healed n (%)
Conservative treatment	16	11 (68.8)
Surgical treatment	3	2 (66.7)
Total	19	13 (68.4)

Discussion

This study provides descriptive insight into nurses' knowledge and competence related to pressure-ulcer prevention and the occurrence of pressure ulcers among hospitalized stroke patients. Overall, nurses demonstrated good understanding of basic preventive principles, which is consistent with findings reported in other studies assessing nursing knowledge using similar approaches [7–11].

However, gaps were identified in epidemiological knowledge and recognition of specific complications. Comparable deficiencies have been documented in studies using validated assessment instruments, suggesting that such gaps are common across different healthcare settings [12, 13]. These findings indicate the need for targeted educational interventions focusing on less well-understood aspects of pressure-ulcer care.

The observed prevalence of pressure ulcers in this study was within the range reported in previous investigations involving hospitalized stroke and neurological patients [14–17]. Nevertheless, interpretation of these findings is limited by the absence of standardized risk-assessment instruments, ulcer staging and detailed documentation of functional and nutritional status. Consequently, causal relationships between nursing knowledge and pressure-ulcer outcomes cannot be established.

Short-term treatment outcomes were generally favorable, with most pressure ulcers healed before discharge following conservative management. However, lack of standardized

documentation limits evaluation of treatment effectiveness and comparison with other studies.

Limitations

The study was conducted in a single institution with a relatively small sample of nurses. The knowledge assessment instrument was non-validated, and clinical documentation lacked standardized ulcer staging and risk-assessment data. The descriptive design precluded causal inference.

Funding source. The authors received no specific funding for this work.

Ethical approval. The Ethics Committee of the Cantonal Hospital in Bihać, Bosnia and Herzegovina, approved the study and informed consent was obtained from all

Conclusion

Nurses demonstrated generally adequate knowledge of pressure-ulcer prevention and care, although specific gaps warrant targeted educational reinforcement. Pressure-ulcer prevalence and short-term outcomes among hospitalized stroke patients were favorable, but interpretation was constrained by methodological limitations. Future studies should incorporate validated assessment instruments, standardized clinical documentation and multicenter approach.

individual respondents. The research was conducted according to the Declaration of Helsinki.

Conflicts of interest. The authors declare no conflict of interest.

References:

1. Gajić A. Current decubitus prevention and treatment algorithm. *Acta Med Croatica* 2014;68(Suppl 1):109–16.
2. Hödl M, Voithofer C. Pressure ulcer risk assessment and preventive measures in mobile patients. *Pflege* 2019;32(4):181–7.
3. Furtado KAX, Infante P, Sobral A, Gaspar P, Eli-sau G, Lopes M. Prevalence of acute and chronic wounds—with emphasis on pressure ulcers—in integrated continuing care units in Alentejo, Portugal. *Int Wound J* 2020;17(4):1002–10.
4. European Pressure Ulcer Advisory Panel (EPUAP); National Pressure Injury Advisory Panel (NPIAP); Pan Pacific Pressure Injury Alliance (PPPIA). Prevention and Treatment of Pressure Ulcers/Injuries: Clinical Practice Guideline. The International Guideline. Emily Haesler (ed.). Osborne Park (WA): Cambridge Media; EPUAP/NPIAP/PPPIA; 2019.
5. Nastavni zavod za javno zdravstvo "Dr Andrija Štampar". Test znanja o osnovama dekubitusu u gerijatrijskih bolesnika [Internet]. Zagreb; 2021 [cited 2025 Jan 15]. Available from: [Testovi iz zdravstvene gerontologije | NZJJZ Andrija Štampar](#)
6. Beeckman D, Serraes B, Anrys C, Van Tiggelen H, Van Hecke A, Verhaeghe S. Static air vs alternating air pressure mattress: randomized trial in nursing homes. *Int J Nurs Stud* 2019;97:105–13.
7. Wu J, Wang B, Zhu L, Jia X. Nurses' knowledge on pressure ulcer prevention: updated systematic review and meta-analysis based on the Pressure Ulcer Knowledge Assessment Tool. *Front Public Health* 2022;10:964680.
8. Grešť Halász B, Bérešová A, Tkáčová L, Mágurová D, Lizáková L. Nurses' knowledge and attitudes towards prevention of pressure ulcers. *Int J Environ Res Public Health* 2021;18(4):1705.
9. Beeckman D, Defloor T, Schoonhoven L, Vanderwee K. Knowledge and attitudes of nurses on pressure ulcer prevention: a multicentre study in Belgian hospitals. *Worldviews Evid Based Nurs* 2011;8(3):166–76.
10. Smith D, Waugh S. Assessment of registered nurses' knowledge of pressure ulcer prevention and treatment. *Kans Nurse* 2009;84(1):3–5.

11. Charalambous C, Koulouri A, Roupa Z, Vasiliopoulos A, Kyriakou M, Vasiliou M. Knowledge and attitudes of nurses in a major public hospital in Cyprus towards pressure ulcer prevention. *J Tissue Viability* 2019;28(1):40–5.
12. Tirkari B, Mirshekari L, Forouzi MA. Pressure injury prevention: knowledge and attitudes of Iranian intensive care nurses. *Adv Skin Wound Care* 2018;31(4):1–8.
13. Barakat-Johnson M, Barnett C, Wand T, White K. Knowledge and attitudes of nurses toward pressure injury prevention: a cross-sectional multisite study. *J Wound Ostomy Continence Nurs* 2018;45(3):233–7.
14. Farid J, Amin E, Sheikh MA, Irfan M, AlRuwaili R, AlRuwaili M, et al. Prevalence and prediction of pressure ulcers in admitted stroke patients. *J Tissue Viability* 2022;31(4):768–75.
15. Caldini LN, Silva RA, Melo GAA, Pereira FGF, Frota NM, Caetano JA. Nursing interventions and outcomes for pressure ulcer risk in critically ill patients. *Rev Rene* 2017;18(5):598–605.
16. Vanderwee K, Clark M, Dealey C, Gunningberg L, Defloor T. Pressure ulcer prevalence in Europe: a pilot study. *J Eval Clin Pract* 2007;13(2):227–35.
17. Gallagher P, Barry P, Hartigan I, McCluskey P, O'Connor K, O'Connor M. Prevalence of pressure ulcers in three university teaching hospitals in Ireland. *J Tissue Viability* 2008;17(4):103–9.

Znanja i kompetencije medicinskih sestara i prevalencija dekubitusa kod pacijenata sa moždanim udarom

Verica Petrović^{1,2}, Anes Budimlić³, Kosana Stanetić^{1,2}, Suzana Savić^{1,2},
Gordana Tešanović^{1,2}

¹Univerzitet u Banjoj Luci, Medicinski fakultet, Banja Luka, Republika Srpska, Bosna i Hercegovina

²Institut za javno zdravstvo Republike Srpske, Dom zdravlja Banja Luka, Republika Srpska, Bosna i Hercegovina

³Univerzitet u Bihaću, Islamski pedagoški fakultet, Bihać, Bosna i Hercegovina

Uvod. Dekubitusi su česte komplikacije kod nepokretnih neuroloških pacijenata, naročito kod obojljelih od moždanog udara. Znanje medicinskih sestara i dosljedna primjena preventivnih mjera imaju ključnu ulogu u smanjenju njihove učestalosti. Cilj ovog rada je da se procjeni znanje, stavovi i samoprocijenjena kompetentnost medicinskih sestara u prevenciji i zbrinjavanju dekubitusa, te da se opiše prevalencija i kratkoročni ishodi liječenja dekubitusa kod hospitalizovanih pacijenata sa moždanim udarom.

Metode. Sprovedena je deskriptivna studija presjeka među 40 medicinskih sestara/tehničara korišćenjem strukturiranog, nevalidiranog upitnika. Analizirana je medicinska dokumentacija 375 uzastopno hospitalizovanih pacijenata sa ishemijskim ili hemoragijskim moždanim udarom radi utvrđivanja pojave i zbrinjavanja dekubitusa.

Rezultati. Medicinske sestre su pokazale dobro poznавање основних preventivnih principa, али су уочени недостaci u znanju iz oblasti epidemiologije i prepoznavanja pojedinih komplikacija. Dekubitusi su registrovani kod pacijenata sa ishemijskim i hemoragijskim moždanim udarom, uz ukupnu prevalenciju od 5,1%. Najčešće je primjenjivan konzervativni tretman, a većina dekubitusa bila je zaliječena u trenutku otpusta.

Zaključak. Znanje medicinskih sestara djeluje uglavnom adekvatno, али уочене praznine ukazuju na potrebu za ciljanim edukativnim intervencijama. Tumačenje prevalencije i ishoda ograničeno je nepostojanjem validiranih instrumenata i standardizovane dokumentacije.

Ključne riječi: dekubitus, moždani udar, znanje medicinskih sestara, prevencija, njega rana, prevalencija