proLékaře.cz | 14.9.2026

doi: 10.48095/cccsnn2022S38

Nurses' knowledge in the field of specific prevention and treatment of heels pressure injuries

Znalosti sester v oblasti specifické prevence a léčby tlakových poranění pat

Abstract

Aim: This study aimed to map the level of general nurses' knowledge of prevention and a general understanding of heel pressure injuries in intensive care units. *Methods:* The questionnaire survey was conducted online through professional web portals. Data analysis was performed using the Shapiro-Wilk test, Mann-Whitney U test at a 0.05 level of significance. *Results:* The survey included 105 general nurses working in intensive care units. The overall average of correct responses in terms of knowledge of heel Pressure injuries prevention was only 63.4%. The higher the declared age of the nurses, the higher their level of knowledge (P = 0.034). As part of the study of the influence of work characteristics, it was found that length of professional experience (P = 0.08) and specialized education (P = 0.3) were not related to the respondents' level of knowledge of preventive nursing interventions. In contrast, the type of workplace affected knowledge of prevention. Respondents from the critical care department have higher knowledge in heel pressure injuries prevention than respondents from the intensive care unit (P = 0.03). For a general understanding of heel pressure injuries, the overall average of correct responses was 76.6%, with no effect of gender, age, education, or other work characteristics (P < 0.05). *Conclusion:* Knowledge in prevention and general knowledge of heel pressure injuries is insufficient in the analyzed study sample. Nurses tend to follow stereotypes experienced in practice.

Souhrn

Cíl: Cílem studie bylo posoudit úroveň vědomostí všeobecných sester pracujících na jednotkách intenzivní péče v oblasti prevence a obecných znalostí o dekubitech na patách. *Soubor a metodika:* Dotazníkový průzkum byl realizován online formou prostřednictvím profesních webových portálů. Analýza dat byla provedena pomocí Shapiro-Wilkova testu, Mann-Whitneyho U testu na hladině významnosti 0,05. *Výsledky:* V průzkumu bylo zařazeno 105 všeobecných sester pracujících na odděleních intenzivní péče. Celkový průměr správných odpovědí v oblasti znalosti prevence dekubitů na patách byl pouze 63,4 %. Čím vyšší byl deklarovaný věk sester, tím byla vyšší úroveň vědomostí (p = 0,034). V rámci zkoumání vlivu pracovních charakteristik bylo zjištěno, že délka praxe (p = 0,08) a specializační vzdělání (p = 0,3) nesouvisí s úrovní znalostí respondentů o preventivních ošetřovatelských intervencích, kdežto typ pracoviště určitý vliv na znalosti v oblasti prevence vykazuje. Respondenti z anesteziologicko-resuscitačního oddělení mají větší znalosti v prevenci dekubitů na patách než respondenti z jednotek intenzivní péče (p = 0,03). V oblasti obecných znalostí o dekubitech na patách byl celkový průměr správných odpovědí 76,6 %, přičemž nebyl prokázán vliv pohlaví, věku, vzdělání, ani dalších pracovních charakteristik (p < 0,05). *Závěr:* Znalosti v prevenci i obecné znalosti o dekubitech na patách byly vyhodnoceny jako nedostatečné ve vybraném souboru. Všeobecné sestry inklinují v praxi zažitým stereotypům.

The Editorial Board declares that the manuscript met the ICMJE "uniform requirements" for biomedical papers.
Redakční rada potvrzuje, že rukopis práce splnil ICMJE kritéria pro publikace zasílané do biomedicínských časopisů.

S. Saibertová[1], P. Kůřil[1,2], A. Menšíková[1,2], P. Búřilová[1,2], A. Pokorná[1]

[1] Department of Health Sciences, Faculty of Medicine, Masaryk University, Brno
[2] Department of Public Health, Faculty of Medicine, Masaryk University, Brno

✉
Prof. PhDr. Andrea Pokorná, PhD
Department of Health Sciences
Faculty of Medicine
Masaryk University
Kamenice 3
625 00 Brno
e-mail: apokorna@med.muni.cz

Key words

knowledge of general nurses – heel pressure injuries – prevention

Klíčová slova

znalosti všeobecných sester – tlaková poranění na patách – prevence

Introduction

Pressure injuries (PIs) on the heels are the second most common location of PIs. They are also the place with the most clinically severe pressure lesions, as confirmed by a European survey in which the prevalence of grade VI heel PIs was reported at 38.5% [1]. The worldwide estimated incidence and prevalence of PIs is 11–17% [2]. PIs localized on the heels occur due to pressure, often in conjunction with other factors such as diabetes mellitus, vascular disease, perfusion problems, poor nutrition, age, mechanical ventilation, and surgery [3]. Because the heel is at the back of the foot, extending

proLékaře.cz | 14.9.2026

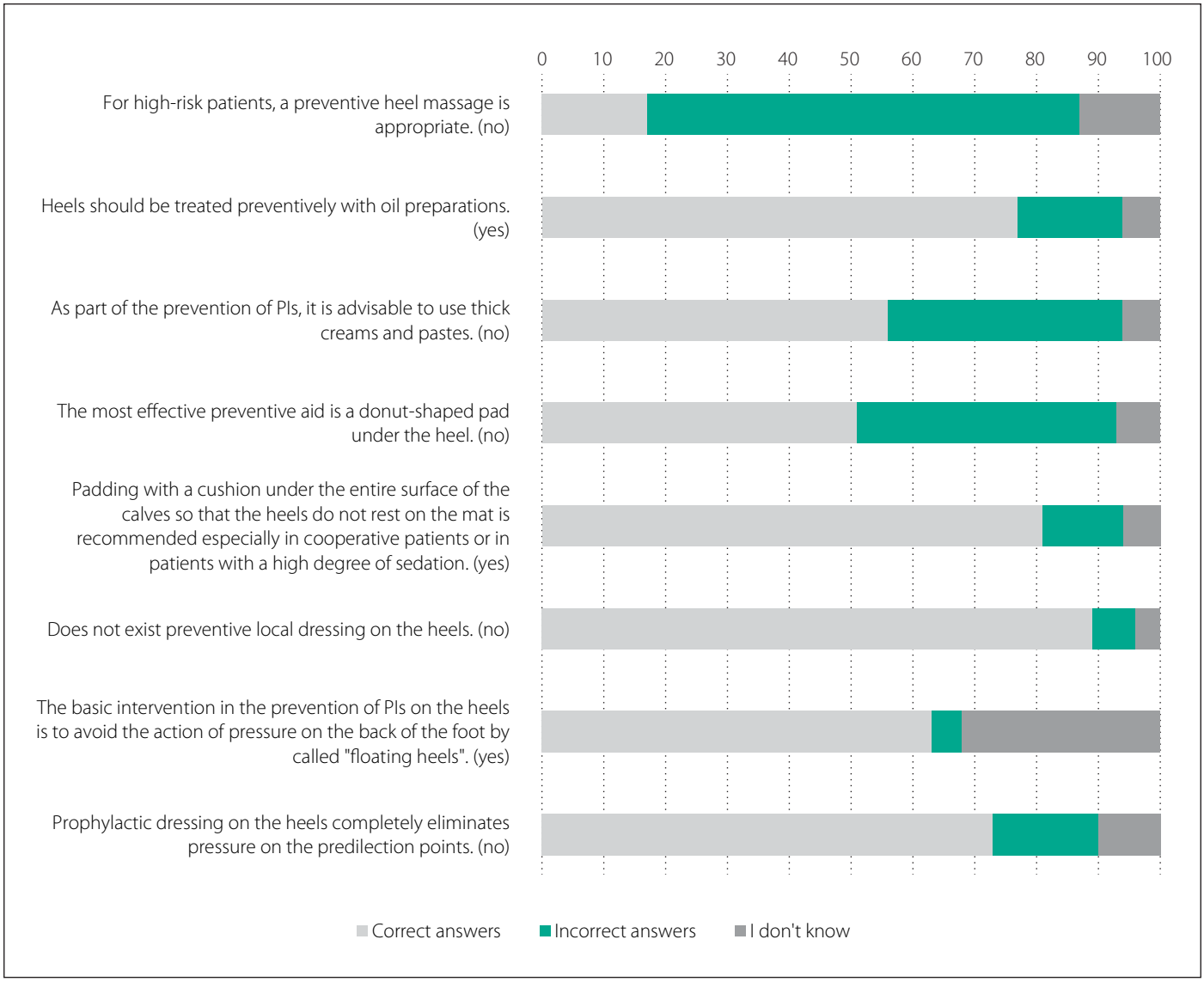

Fig. 1. Knowledge related to the PIs prevention on the heels.
Obr. 1. Znalosti v oblasti prevence tlakových lézí na patách.

from the Achilles tendon around the plantar surface and covering the top of the calcaneus bone, it is a common site for PI, especially for people with impaired mobility particularly those who have spinal cord injury. The bone and tendon can be affected very quickly because there is little underlying connective tissue in the area [4]. To apply effective preventive interventions, it is primarily necessary to assess the risk of PIs on the heels together with complete control of the skin of the lower limbs. The lower limbs can be affected by other disease processes (ischaemia, oedema, structural changes due to fractures or bone disorders, and neuropathy) that affect the development and healing of PIs. The essential intervention in the prevention of heel PIs is to avoid pressure on the back of the foot by floating heels, where a cushion or foam pad is most often used to elevate the lower limbs to completely release the heels from the mattress surface (removing heel contact with the pad). The effectiveness of the intervention is demonstrated by studies based on clinical evidence that heel raises are more effective in preventing PIs than no heel raises [5,6]. For patients, uncooperative, restless, or with increased lower limb movement due to other conditions, positioning with a pillow or foam pad may be inappropriate or ineffective. For this group of patients, heel offloading aids are suitable, called the „offloading heel" procedure, which either reduces pressure or relieves the heel completely. The aids are in the form of foam pads moulded into the shoe to lift the heel and keep the foot in a neutral position [7]. For restless patients who are at risk of a friction lesion on the heel, experts recommend reducing friction by using special devices in the form of pads, prophylactic coverings, or amorphous materials that create a protective barrier on the skin [8]. However, we still encounter unrecommended or ineffective preventive procedures, e.g., the use of traditional aids in the form of „cotton boots and bandages" in clinical practice. It is an outdated practice that leads to reduced heel skin monitoring capabilities and increases the temperature of the acral parts of the lower limb, with hyperaemia exacerbating the local heel condition, especially when in contact with the pad. The use of donut pads under the heel

proLékaře.cz | 14.9.2026

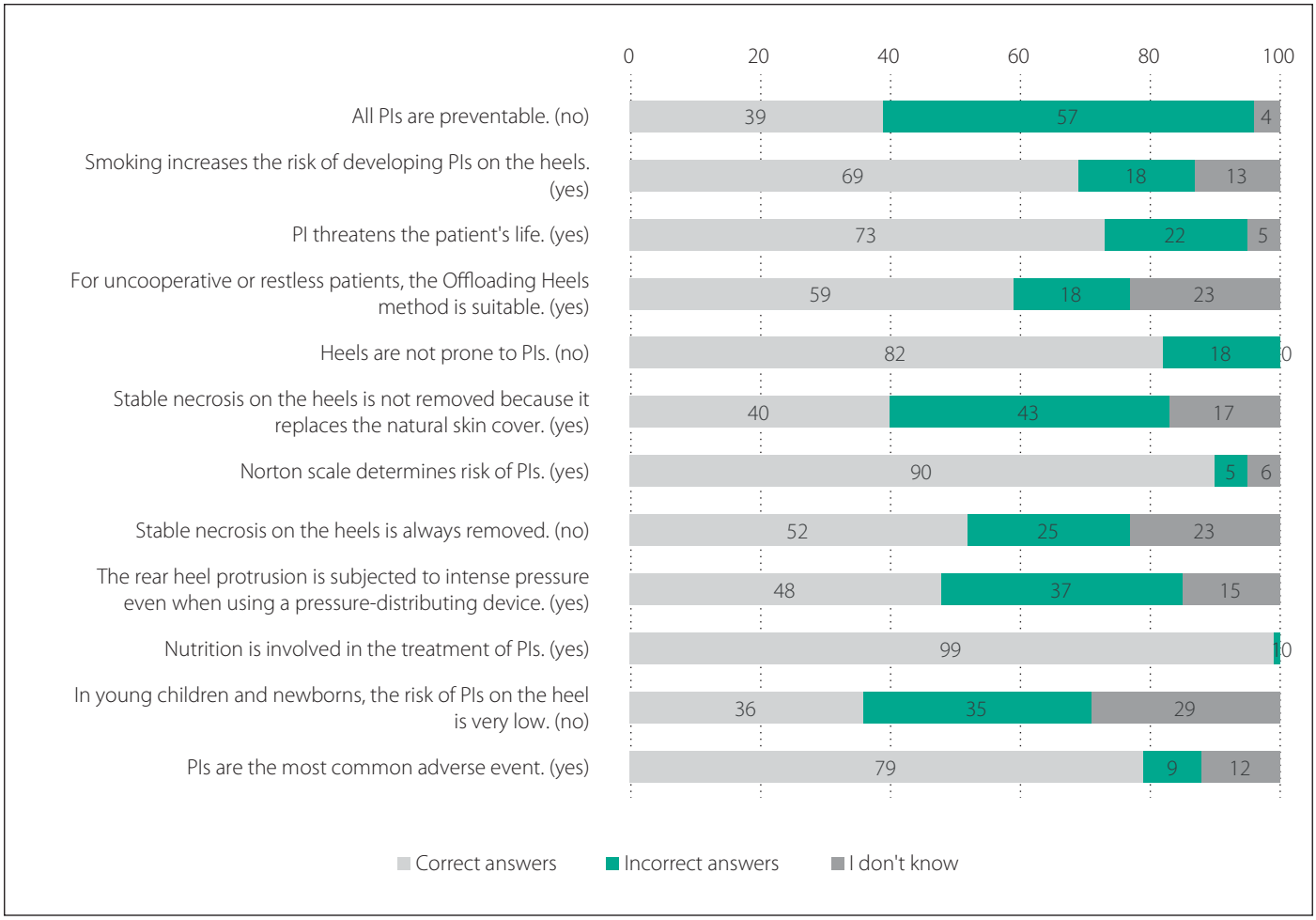

Fig. 2. General knowledge about PIs on heels (%).

Obr. 2. Obecné znalosti o tlakových lézích na patách (%).

is an equally inadvisable practice, with inappropriate pressure of the device's edges on surrounding tissue [7]. This paper presents the results of a questionnaire survey among selected sample of general nurses working in intensive care, assessing their level of knowledge in prevention and a general understanding of pressure injuries on the heels.

Methods

The questionnaire survey targeted general nurses working in inpatient intensive care units. The questionnaire was distributed electronically via professional web portals. It contained 20 structured items focusing on two areas, namely, preventive nursing interventions for PIs and general knowledge in this area. The other six items focused on the identification and sociodemographic data of the respondents. The knowledge items were presented as statements, where respondents expressed agreement or disagreement with the statement. The responses were evaluated by assessing the number of correct and incorrect responses to each statement. The answer „don't know" reduced the estimate and the percentage of correct and incorrect answers. The statements were not deliberately ordered in sequence but were arranged in random locations in the questionnaire. Data analysis was performed using the Shapiro-Wilk test, Mann-Whitney U test at a 0.05 level of significance.

Results

A total of 105 general nurses were included in the survey, with a significant majority of 97 (92.4%) women and 8 (7.6%) men. The average age of the respondents was 35.5 years (Min. 22, Max. 58 years), and their average length of practice was 13.7 years (Min. 1, Max. 40 years). The most frequently declared level of education was higher education; the bachelor's degree was represented in 46 cases (43.8%) and the master's degree in 26 cases (24.8%). The overall average of correct answers in terms of knowledge of heel PIs prevention was only 63.4%. The individual percentages of all responses are shown in Fig. 1.

In the analysis of 8 knowledge items focused on knowledge of heel PIs prevention, the effect of gender ($P = 0.38$) and education ($P = 0.191$) was not verified.

Knowledge of prevention varied by age ($P = 0.034$). Thus, the higher the age of the respondents, the higher the knowledge of heel PI prevention. In exploring the effect of work characteristics, it was found that length of practice ($P = 0.08$) and specialized education ($P = 0.3$) were not related to the respondents' level of knowledge of preventive nursing interventions. In contrast, the type of workplace affected knowledge of prevention. Respondents from the critical care departments understand heel PIs prevention better than respondents from intensive care units ($P = 0.03$).

The overall mean of correct responses was 76.6% for general knowledge of heel PI. The individual percentages of all answers are shown in Fig. 2.

proLékaře.cz | 14.9.2026

In the analysis of 12 knowledge items focusing on general knowledge about PIs in heels, there was no effect of gender (P = 0.69), age (P = 0.17), or education (P = 0.38). Also, length of practice (P = 0.20) and specialized education (P = 0.79), and type of workplace (P = 0.15) were not related to the respondents' level of general knowledge of PIs on the heels. The full data are available upon the reasonable request to the authors team.

Discussion

The questionnaire survey revealed knowledge gaps among general nurses in prevention and knowledge of PIs on heels. Similar results have been confirmed in previous studies in the Czech Republic and many international studies [9–13].

In the area of knowledge of prevention of PIs on heels, the average of correct answers was only 63.4%. The least successful score of correct answers was for the statement, *„For high-risk patients, a preventive heel massage is appropriate."* Only 17% of the respondents answered this statement correctly, 70% believed that heels should be massaged, and 13% did not know. However, professional societies do not recommend firm skin rubbing in patients at risk of developing PIs, nor do they recommend massage, especially where the fat and muscle layer is weak, and there is a risk of deep tissue damage [7].

One of the other items with a low score of correct answers was the statement *„The most effective preventive aids is a donut-shaped pad under the heel",* where 42% of respondents believe that the most effective preventive aid is a donut-shaped pad, and 7% of respondents do not know. Thus, almost half of the respondents mistakenly consider this long outdated and counterproductive aid useful. Similar results are found abroad, for example, in Turkey, Belgium, and Australia [14–16]. Traditionally rooted information about the so-called donut-shaped pad's effect as the best possible solution in preventing and treating PIs on the heel persists among nurses. However, clinical evidence for this hypothesis is lacking [7].

In general knowledge of heel PIs, the overall average of correct answers was 76.6%. The least successful score of correct answers was for the statement, *„In young children and newborns, the risk of PI on the heel is very low."* Only 36% of respondents correctly disagreed with this statement, with expert sources stating that the heel is a widespread vulnerable pressure area in newborns. The overall shape of the heel and the tension of the fragile skin covering the instep bone contribute to the increased risk of PIs. However, due to the low tension in the immature Achilles tendon, it is not injured as in adult patients [17]. One of the main reasons for the inadequate knowledge of PIs among children in our sample of respondents may be their focus on adult patients in intensive care.

The statement *„All PIs are preventable"* was among the items with the lowest score of correct answers. Only 39% of respondents answered *„no"* correctly. PIs can be divided into preventable and those that are essentially unavoidable. These occur despite correct risk assessment and the maximum possible preventive measures targeted at the individual patient. Inevitable PIs occur in critically ill patients, often haemodynamically unstable, or those whose underlying disease does not even allow micropositioning. Examples include patients with spinal cord injury, extensive burns, malnourished patients, septic and terminal conditions [18].

In the statement, *„Stable necrosis on the heels is not removed because it replaces the natural skin cover."* 40% of respondents answered *„yes"* correctly. This statement was repeated once more in the questionnaire in a modified form: *„Stable necrosis on the heels is always removed"*, and in this case, 52% of respondents correctly answered *„no"*. According to the recommendations of the European Pressure Ulcer Advisory Panel (EPUAP), a dry and stable eschar on a heel wound with no signs of infection could protect the heel bone. Therefore, it is not recommended to remove it [7]. However, some experts believe that necrotic tissue on the heel should always be removed to improve the healing process, especially in diabetic patients, and suggest further research focus on this therapeutic intervention [19].

It is quite evident from the international studies focused on the level of nurses' knowledge in the prevention and treatment of PIs over the last ten years that a change in the established routine practice of nursing staff is a long-term process that depends on the motivation of nursing staff as well as on the management of health care facilities. However, targeted time education of nursing staff does not guarantee a sustained increase in knowledge, and it is essential to ensure repetition. We have to highlight the limitation of respondent numbers and due to this there is not possible to generalise the conclusion to the whole nurses population.

Conclusion

The questionnaire survey confirmed the lack of knowledge among selected general nurses working in intensive care about PIs on heels. They have a lack of knowledge both in terms of prevention and general knowledge about PIs on heels. Nurses, knowledge is essential to reduce the incidence and prevalence of PIs on the heel, especially in preventive interventions. All efforts need to move away from the established traditionalist attitudes of nurses in practice and focus on effective preventive and therapeutic interventions.

Financial support

This study was written at Masaryk University as a part of the project „A comprehensive approach to skin and mucosal integrity disorders II." number MUNI/A/1341/2021 with the support of the Specific University Research Grant, as provided by the Ministry of Education, Youth and Sports of the Czech Republic in the year 2021.

Conflict of interest

The authors declare they have no potential conflict of interest concerning drug, product, or services used in the study.

References

1. Vanderwee K, Clark M, Dealy C et al. Pressure ulcer prevalence in Europe: a pilot study. J Eval Clin Pract 2007; 13(2): 227–232. doi: 10.1111/j.1365-2753.2006.00684.x.

2. Dube A, Sidambe V, Verdon A et al. Risk factors associated with heel pressure ulcer development in adult population: a systematic literature review. J Tissue Viability 2022; 31(1): 84–103. doi: 10.1016/j.jtv.2021.10.007.

3. Delmore B, Ayello EA, Smith D et al. Refining heel pressure injury risk factors in the hospitalized patient. Adv Skin Wound Care 2019; 32(11): 512–519. doi: 10.1097/01.ASW.0000579704.28027.d2.

4. Luboz V, Perrier A, Bucki M et al. Influence of the calcaneus shape on the risk of posterior heel ulcer using 3D patient-specific biomechanical modeling. AnnBiomedEng2015;43(2):325–335.doi:10.1007/s10439-014-1182-6.

5. Donnelly J, Winder J, Kernohan WG et al. An RCT to determine the effect of a heel elevation device in pressure ulcer prevention post-hip fracture. J Wound Care 2011; 20(7): 309. doi: 10.12968/jowc.2011.20.7.309.

6. Bååth C, Engström M, Gunningberg L et al. Prevention of heel pressure ulcers among older patients – from ambulance care to hospital discharge: a multi-centre randomized controlled trial. Appl Nurs Res 2016; 30: 170–175. doi: 10.1016/j.apnr.2015.10.003.

7. Haesler E. European Pressure Ulcer Advisory Panel, National Injury Advisory panel and Pan Pacific Pressure Injury Alliance. Prevention and Treatment of Pressure Ulcers/Injuries: Quick Reference Guide. 2019. [online]. Available from URL: file:///C:/Users/156459/Downloads/ggg-quick-reference-guide-version04dec2019-secured.pdf.

8. Rivolo M, Dionisi S, Olivari D et al. Heel pressure injuries: consensus-based recommendations for assessment

proLékaře.cz | 14.9.2026

and management. Adv Skin Wound Care (New Rochelle) 2020; 9(6): 332–347. doi: 10.1089/wound.2019.1042.
9. Saibertová S, Pokorná A. Nurses knowledge in presure ulcers management related to the monitoring of the incidence and prevalence of pressure ulcers: a questionnaire survey. Prakt Lék 2021; 101 (Suppl 1, díl 2): 27–31.
10. Kambová V, Pokorná A, Saibertová S. The knowledge and practises of nurses in the prevention of medical devices related injuries in intensive care – questionnaire survey. Cesk Slov Neurol N 2019; 82/115 (Suppl 1): S19–S22. doi: 10.14735/amcsnn2019S19.
11. Ebi WE, Hirko GF, Mijena DA. Nurses' knowledge to pressure ulcer prevention in public hospitals in Wollega: a cross-sectional study design. BMC Nursing 2019; 20: 18. doi: 10.1186/s12912-019-0346-y.
12. Dalvand S, Ebadi A, Gheshlagh RG. Nurses' knowledge on pressure injury prevention: a systematic review and meta-analysis based on the Pressure Ulcer Knowledge Assessment Tool. Clin Cosmet Investig Dermatol 2018; 11: 613–620. doi: 10.2147/CCID.S186381.
13. Charalambous C, Koulouri A, Roupa Z et al. Knowledge and attitudes of nurses in a major public hospital in Cyprus towards pressure ulcer prevention. J Tissue Viability 2019; 28(1): 40–45. doi: 10.1016/j.jtv.2018.10.005.
14. Gul A, Andsoy II, Ozkaya B et al. A descriptive, cross-sectional survey of Turkish nurses' knowledge of pressure ulcer risk, prevention, and staging. Ostomy Wound Manage 2017; 63(6): 40–46.
15. Tallier PC, Reineke PR, Asadoorian K et al. Perioperative registered nurses knowledge, attitudes, behaviors, and barriers regarding pressure ulcer prevention in perioperative patients. Appl Nurs Res 2017; 36: 106–110. doi: 10.1016/j.apnr.2017.06.009.
16. Fulbrook P, Lawrence P, Miles S. Australian nurses' knowledge of pressure injury prevention and management: a cross-sectional survey. J Wound Ostomy Continence Nurs 2019; 46(2): 106–112. doi: 10.1097/WON.0000000000000508.
17. Ciprandi G, Crucianelli S. Top tips: preventing pressure ulcers in premature babies and neonates. Wounds International 2015, 6(4): 5–9.
18. Levine JM, Zulkowski KM. Secondary analysis of office of inspector general's pressure ulcer data: incidence, avoidability, and level of harm. Adv Skin Wound Care 2015; 28(9): 420–428. doi: 10.1097/01.ASW.0000470070.23694.f3.
19. Rivolo M, Dionisi S, Olivari D et al. Heel pressure injuries: consensus-based recommendations for assessment and management. Adv Wound Care (New Rochelle) 2020; 9(6): 332–347. doi: 10.1089/wound.2019.1042.