J Wound Ostomy Continence Nurs. 2023;50(2):162-166.
Published by Lippincott Williams & Wilkins

Incidence and Characteristics of Suspected Deep Tissue Pressure Injuries on the Foot and Ankle

A Retrospective Study

James Canfor ◆ Lucia Michailidis ◆ Cylie Williams

NCPD 2.0 ANCC Contact Hours

ABSTRACT

PURPOSE: The purpose of this study was to measure the incidence of suspected deep tissue pressure injuries (DTPIs) in patients admitted to the hospital, describe their location, identify the related hospital length of stay, and explore any associations between intrinsic or extrinsic factors relevant to DTPI development.

DESIGN: Retrospective review/audit of clinical data.

SUBJECTS AND SETTING: We reviewed pertinent medical data from patients reported as developing a suspected deep tissue injury during hospital admission from January 2018 to March 2020. The study setting was a large tertiary public health service in Victoria, Australia.

METHODS: Patients who developed a suspected deep tissue injury during hospital admission between January 2018 and March 2020 were identified through the hospital online risk recording system. Data were extracted from the relevant health records, including demographics, admission data, and pressure injury data. The incidence rate was expressed per 1000 patient admissions. Multiple regression analyses were used to determine associations between the time (days) to develop a suspected deep tissue injury and intrinsic (patient level) or extrinsic (hospital level) factors.

RESULTS: Six hundred fifty-one pressure injuries were recorded during the audit period. A minority (9.5%; n = 62) of patients developed a suspected deep tissue injury; all were located on the foot and ankle. The incidence of suspected deep tissue injuries was 0.18 per 1000 patient admissions. The mean length of stay among patients who developed a DTPI was 59.0 (SD = 51.9) days as compared to a mean of 4.2 (SD = 11.8) days for all patients admitted to the hospital during this period. Multivariate regression analysis determined that the longer time (in days) to develop a pressure injury was associated with having a higher body weight (Coef = 0.02; 95% CI = 0.00 to 0.04; $P = .043$), not having off-loading (Coef = −3.63; 95% CI = −6.99 to −0.27; $P = .034$), and an increasing number of ward transfers (Coef = 0.46; 95% CI = 0.20 to 0.72; $P = .001$).

CONCLUSIONS: Findings identified factors that may play a role in the development of suspected deep tissue injuries. A review of risk stratification in health services may be beneficial, with consideration to adjustments of procedural assessments of patients at risk.

KEY WORDS: Ankle, Foot, Foot injury, Pressure injury, Pressure ulcer, Suspected deep tissue injury, Ulcer.

INTRODUCTION

Hospital-acquired pressure injuries are one of the most frequently occurring adverse events worldwide.[1] These are largely preventable injuries of the skin and subcutaneous tissue, which commonly impact patient morbidity, mortality, and the costs associated with hospital care.[1,2] In 2015-2016, the Australian Commission on Safety and Quality in Healthcare reported approximately 4313 occasions of hospital-acquired pressure injuries estimated to cost the Australian health care system approximately A$983 million (US $665 million).[3]

Pressure injuries develop due to unrelieved pressure, friction, or shearing forces (cytoskeleton deformation); they typically occur over a bony prominence.[4,5] This prolonged compression leads to occlusion of blood vessels and ischemia, lymphatic blockage, edema, and reperfusion damage, resulting in cell damage and tissue apoptosis, which can present as blistering, bruising, and deep tissue injury.[4,5] Pressure injuries commonly present at the heels. The second most common anatomical location is the sacrum.[1,4,6,7] Pressure injuries are also classified according to their severity and depth of tissue damage, regardless of the body location; these classifications are referred to as categories or stages.[8] In 2016, the US National Pressure Injury Advisory Panel (NPIAP) updated its pressure injury taxonomic classification system to include 2 additional stages: unstageable (full-thickness tissue loss) and suspected deep tissue injury defined as lesions of unknown depth of

James Canfor, Masters of Podiatric Practice, *Podiatry Department, Peninsula Health, Frankston, Victoria, Australia.*

Lucia Michailidis, PhD, *Podiatry Department, Peninsula Health, Frankston, Victoria, Australia.*

Cylie Williams, PhD, *Academic Research Unit, Peninsula Health, Frankston, Victoria, Australia; and School of Primary and Allied Health, Monash University, Frankston, Victoria, Australia.*

Supplemental digital content is available for this article. Direct URL citation appears in the printed text and is provided in the HTML and PDF versions of this article on the journal's Web site (JWOCNOnline.com).

The authors declare no conflicts of interest.

Correspondence: *James Canfor, Masters, Podiatry Department, Monash Health, 122 Thomas St, Dandenong, VI, 3175, Australia (james.canfor@monashhealth.org).*

DOI: 10.1097/WON.0000000000000956

tissue damage presenting as deep bruising sometimes with overlying blistering and possessing the potential to develop into large, deep wounds.[9] Once a hospital-acquired pressure injury develops, there is an increased chance of prolonged patient hospitalization, wound infection, surgical intervention, pain, and disability.[1]

Australian hospitals are required to report hospital-acquired pressure injury data under the National Safety and Quality Health Service (NSQHS) standards.[10] In Victoria, this is captured in an online statewide risk register, a standardized data set for clinical incidents managed by the Victorian Agency for Health Information.[11] This database enables local health care services to monitor local data and respond appropriately if there are any changes in pressure injury frequency.

Between 2018 and 2020, a tertiary public health service in Victoria observed an increase in the number and severity of hospital-acquired pressure injuries compared to the previous years. The most severe stage of pressure injury recorded was suspected deep tissue pressure injuries (DTPIs). The podiatry department reviews its clinical records to confirm reports of a suspected DTPI when located on the foot or ankle. Our podiatry department commonly works in collaboration with nursing staff and is routinely responsible for review and care directives for all stages of pressure injuries located on the foot and ankle. The primary aim of this research was to determine the incidence of suspected DTPIs that developed in an Australian tertiary hospital over a 2-year period. Secondary aims were to describe the anatomical locations of suspected DTPIs and differences in length of stay between patients with and without a suspected DTPI. Finally, we aimed to analyze associations between intrinsic (patient factors) and extrinsic factors (health care service factors including admission and pressure injury data such as routine off-loading of patients at risk) of patients who developed a suspected DTPI.

METHODS

Data were collected via a retrospective audit of medical records (retrospective chart review). The sample comprised patients who developed a suspected DTPI during hospital admission between January 2018 and March 2020. Cases were identified through a standard reporting system. Specifically, all clinicians within the hospital are educated and mandated to report pressure injuries within the electronic medical record system. When a report is generated, a wound care nurse is notified and the podiatry department is notified if the pressure injury is located on the ankle or foot. Either the wound care nurse or podiatrist reassesses the patient, updates any relevant information, and reconfirms the type of pressure injury. Analysis of patient records within this retrospective study was limited to pressure injuries located on the foot or ankle and assessed by a podiatrist. A pressure injury was deemed hospital acquired if it was not recorded as present on admission to the health service within the first 24 hours. Data collection and analysis procedures were reviewed and determined to be a quality improvement activity; as a quality improvement project, it was exempted from requiring individual informed consent (Peninsula Health QA/60291/PH-2020).

The setting of the quality improvement project was Peninsula Health, a large tertiary public health service in Victoria, a state in southern Australia. Peninsula Health comprises approximately 19 inpatient wards in a single acute care facility, 2 subacute care facilities, and 1 combined acute and subacute facility. The approximate number of hospital admissions per year is 95,200.

Data Collection

Pressure injury data were captured in an online statewide risk register, which is a standardized data set for clinical incidents that is managed by the Victorian Agency for Health Information.[10] A purpose-built audit tool was developed using Microsoft Excel 2018 software (Microsoft Corp, Redmond, Washington). Data for this quality improvement project were extracted from this database.

Study Procedures

Summary statistics for the total of admissions (excluding maternity, day procedures, and babies born requiring admission) during the time frame were obtained from the hospital's health information services. These data included the mean (standard deviation, SD) and median (interquartile range, IQR) length of stay for all patients admitted between January 1, 2018, and March 31, 2020. The online risk record, localized to Peninsula Health, was searched between the dates of interest to identify all pressure injuries reported. Patients who developed a suspected DTPI as an inpatient were extracted for inclusion in this retrospective review. The health record of each patient was then reviewed for a description of pressure injury indicating suspected DTPI or identification of suspected DTPI based on a note from a podiatrist. Data domains were extracted manually by a single researcher (J.C.); 20% of records were reviewed by the second researcher (L.M.) to ensure accuracy of data extraction.

Primary and secondary outcome measures recorded were the presence of a suspected DTPI, anatomical location, hospital length of stay, number of ward transfers, body weight on admission, pressure redistribution devices in place prior to injury, surgical procedure during the relevant admission, and a history of peripheral arterial disease. Table 1 summarizes the domains and data fields extracted from patient clinical records.

Data Analysis

Data analysis was completed using Stata 15 (StataCorp, College Station, Texas). If a patient had more than 1 suspected DTPI, analysis was based on data obtained from the date of the first identified injury. Incidence of pressure injury rate and suspected DTPI rate was determined and expressed per 1000 patient admissions. The formula for incidence is as follows:

$$\frac{\text{Number of admissions (patients) developing an injury during time period} \times 1000}{\text{Total admissions during time period}}$$

Length of stay was initially described using means and SDs, and medians and IQRs, and compared to the length of stay of those who developed a pressure injury during their inpatient stay. Raw data were not available for the entire population of inpatients. This limited our ability to compare the entire inpatient population to those with a suspected DTPI. Due to the nonparametric and summative nature of available length of stay data, population differences were only numerically described. Not all patients were evaluated for frailty using a common, validated instrument; in addition, some were assessed using different frailty measures. As a result, no mortality burden or comorbidity index was calculated.

Regression analyses were undertaken, and data transformations were investigated to improve model fit. A square root transformation was applied to the time to develop a suspected

TABLE 1.
Data Extracted From Health Records

Domain	Data Fields
Patient information	Age at admission, y
	Sex (male, female, indeterminate)
	Weight, kg
Admission data	Time to pressure injury first recorded, d
	Length of stay, d
	Surgical procedure during admission (Yes/No)
	Number of surgical procedures during admission (total number)
	Number of ward transfers during admission (total number)
Pressure injury data	Anatomical location (rearfoot, forefoot/midfoot)
	Pressure injury risk score using the Braden Scale (11) (score)
	Number of pressure injury devices in place at time of pressure injury development (total number of devices in place)
	Types of prevention devices in place prior to pressure injury identification (air mattress, pillow or heel wedge, bed cradle, patient repositioning, off-loading with other devices) (Yes/No)
	Suspected peripheral arterial disease determined by pedal vascular assessment (palpation of pulses, handheld ultrasound Doppler, toe pressure index) (Yes/No)

DTPI because residuals were not normally distributed. A multivariate regression model was developed from univariate linear regression analysis of the time (days) to develop a suspected DTPI and intrinsic patient factors (age in years, weight in kilograms, sex, cumulative Braden Scale score for Pressure Sore Risk) and extrinsic health care service factors (number of ward transfers or surgery during admission, use of pressure injury prevention strategies).[12] Pressure injury prevention strategies included use of an air mattress for pressure redistribution, pillow/heel wedge, bed cradle, off-loading, or podiatry padding reported.[13] A backward stepwise multiple regression analysis was then performed using variables from the univariate analysis with a value of $P < 0.2$. The variable with the least significant fit was considered and removed from the model in a backward stepwise procedure until all variables were significant at $P < .05$. Output was described with the direction and value of the coefficient (Coef), 95% CI, and P value.

RESULTS

During data collection, 127,050 (acute: n = 118,432; subacute: n = 8618) patients were admitted, and 651 experienced a pressure injury. Sixty-two (9.2%) patients who developed a hospital-acquired pressure injury were reported as developing a suspected DTPI; all were located on the foot or ankle, yielding an incidence rate of 0.18 per 1000 patient admissions. Additional pressure injuries of other stages were identified on the foot and ankle, but this quality improvement project is limited to suspected DTPIs of the foot or ankle.

The mean hospital length of stay for all admissions during the data collection was 4.2 (SD = 11.8) days. The mean length of stay for all admissions to an acute care facility (hospital) was 2.7 (SD = 7.0) days; the median stay was 1 (IQR = 0-3) day. The mean length of stay for all patients admitted to a subacute facility was 23.9 (SD = 31.2) days; the median length of stay was 15 (IQR = 9-26) days. Among patients who had developed a hospital-acquired suspected DTPI, the mean length of stay was 59.0 (SD = 51.9) days versus median length of stay of 41 (IQR = 23-72) days. Table 2 summarizes intrinsic and extrinsic factors related to pressure injury risk.

Details of the univariate analysis are located in Supplemental Digital Content (available at: http://links.lww.com/JWOCN/A87). The following factors from the univariate analysis were

TABLE 2.
Intrinsic and Extrinsic Factors Potentially Linked to DTPI Development

	Mean (SD), Median (IQR), or n (%)
Intrinsic factors	
Sex (female)	33 (53.2%)
Age, y	75 (14)
Weight, kg	76 (23)
Suspected peripheral arterial disease (present)	29 (46.8%)
Anatomical location	
Rear foot (ankle or heel)	49 (79.0%)
Forefoot or mid-foot	13 (21.0%)
Time until pressure injury identified, d	22 (29), 17 (8-25)
Braden Scale score on day pressure injury identified	
Very high	4 (6.5%)
High	8 (12.9%)
Moderate	15 (24.2%)
Low	19 (30.6%)
No risk	4 (6.5%)
Not assessed	12 (19.4%)
Extrinsic factors	
Length of stay, d	60 (54), 41 (23-72)
Number of ward transfers	2 (2), 2 (1-2)
Surgical procedure during admission (Yes)	19 (30.6%)
Number of surgeries during admission	2 (2), 1 (1-4)
Time to surgery, d	36 (92), 6 (4-15)
Number of prevention measures before pressure injury identified	
No measures	23 (37.0%)
1 measure	18 (29.0%)
2 measures	16 (25.8%)
3 measures	4 (6.5%)
4 measures	1 (1.61%)
Type of prevention measures before pressure injury identified	
Air mattress	26 (41.9%)
Pillow/heel wedge	6 (9.7%)
Bed cradle	1 (1.6%)
Repositioning	33 (53.2%)
Off-loading or padding	1 (1.6%)

Abbreviation: DTPI, deep tissue pressure injury.

included in the multivariate analysis: body weight, use of a pressure redistributing support surface, pressure off-loading strategies, and number of transfers between hospital wards (inpatient care units). Multivariate regression indicated that the development of a DTPI was significantly associated with a higher body weight (Coef = 0.02; 95% CI = 0.00 to 0.04; $P = .043$), not having pressure off-loading with another device (Coef = −3.63; 95% CI = −6.99 to −0.27; $P = .034$), and an increasing number of ward transfers (Coef = 0.46; 95% CI = 0.20 to 0.72; $P = .001$).

DISCUSSION

Data analysis from this quality improvement project identified several factors associated with the development of a suspected DTPI of the foot or ankle during inpatient care. Findings from multivariate analysis indicate that higher body weight, the absence of a pressure redistribution surface, and a higher number of ward transfers were associated with developing a suspected DTPI. These findings suggest possible opportunities for the improved prevention of suspected DTPIs of the foot and ankle. These changes may include revision of criteria for the use of pressure redistributing surfaces, targeted pressure injury handover, and reassessment of pressure injury risk at the time of transfers.

A previous study of predictors of hospital-acquired pressure injuries found that a longer length of stay significantly increased the chance of developing a pressure injury.[14] While our study is unable to determine if the longer length of stay is directly related to the development of a pressure injury, we did have a similar finding that those patients who developed a suspected deep tissue injury had a longer mean length of stay (60 days) compared to the general population admission to the hospital (4.2 days).

Multiple ward transfers during single admissions have been previously reported to increase the risk of pressure injury development[15]; yet, we found that increased transfers resulted in an increased time to develop a suspected DTPI of the foot or ankle. We were unable to determine if the number of ward transfers in this cohort was different from that of the rest of the population or if the transfers occurred as a result of a DTPI occurrence versus another change in the patient's medical condition. Our findings should be viewed in the context of a small population, with an average of 2 ward transfers per patient.

Findings of this quality improvement project highlight the unique and complex nature of suspected DTPIs of the foot and ankle. An international pressure injury point prevalence study reported a similar rate for suspected DTPIs (9%); that study also found that most of these pressure injuries occurred on the heel.[16] The heel is at particular risk for suspected DTPI; this risk is at least partially attributable to the anatomy of the rear foot.[9,17] While the time to developing a pressure injury and association between body mass index has not been previously explored, a link has been reported between the incidence of pressure injury development and body mass index.

Previous research suggests that patients who are underweight or have class 3 obesity are at a higher risk for developing pressure injuries.[18] Findings from our study supports this evidence.

Nearly half of the patients who developed a suspected deep tissue injury in this study had some degree of lower-limb peripheral arterial disease; however, analysis indicated no significant association between peripheral arterial disease and suspected DTPIs. Vascular compromise in the lower limb increases the risk of ischemic changes in the foot, and when coupled together with unrelieved pressure may increase the risk of developing a pressure injury.[19,20] Additional research is needed to clarify the relationship between peripheral arterial disease and DTPI risk.

Mechanical (tissue) loading is a key etiologic factor in the development of suspected DTPIs.[9] Pressure redistributing or off-loading measures in health care are supported by limited evidence; nevertheless, their use is recommended in clinical practice guidelines for pressure injury prevention.[8,21] Strategies include regular turning and repositioning, use of pressure redistributing devices, and off-loading pressures on the heel.[8,21-23] Many patients within our study had some form of pressure injury redistribution such as regular turning and repositioning and use of pressure redistributing support surface (mattress). In contrast, strategies for off-loading pressure such as wedges were rarely used, which may explain why all the suspected DTPIs in our quality improvement project were located on the ankle or heel.

Limitations

Several limitations may have influenced the generalizability of our findings. The retrospective nature of this study and the absence of a comparison or control group limit our ability to attribute suspected DTPI development to specific intrinsic or extrinsic factors. During the time frame of this study, there was a period of organizational change from paper to electronic medical records, resulting in missing data. Electronic medical records present exciting opportunities in the future for whole service data extraction, and researchers should consider standardizing data fields for pressure injury research to maximize sample size and potentially collaborate with other health care organizations.

CONCLUSIONS

We measured the incidence of hospital-acquired suspected DTPIs in an Australian hospital. We identified the differences in length of stay of those patients with a suspected DTPI and what intrinsic and extrinsic factors that may play a role in their development. A review of risk stratification in health services may be beneficial in the future, with consideration to adjustments of procedural assessments of patients at risk. Additional investigation is needed to determine risk and protective factors for development of suspected DTPIs and the efficacy of specific or bundled preventive interventions.

REFERENCES

1. Li Z, Lin FF, Thalib L, Chabouer W. Global prevalence and incidence of pressure injuries in hospitalised adult patients: a systematic review and meta-analysis. *Int J Nurs*. 2020;105:103546. https://www.researchgate.net/profile/Zhaoyu-Li-13/publication/338945145_Global_prevalence_and_incidence_of_pressure_injuries_in_hospitalised_adult_patients_A_systematic_review_and_meta-analysis/links/5e69a574299bf1b9f7ce2e9c/Global-prevalence-and-incidence-of-pressure-injuries-in-hospitalised-adult-patients-A-systematic-review-and-meta-analysis.pdf. Accessed October 10, 2021.
2. Holbrook S, O'Brien-Malone C, Barton A, Harper K. A quality improvement initiative to reduce hospital-acquired pressure injuries (HAPI) in an acute inpatient setting by improving patient education and seating. *Wound Pract Res*. 2021;29(4):198-205.

3. Nguyen KH, Chaboyer W, Whitty JA. Pressure injury in Australian public hospitals: a cost-of-illness study. *Aust Health Rev*. 2015;39(3):329-336. doi:10.1071/AH14088.
4. Al Aboud AM, Manna B. *Wound Pressure Injury Management*. Treasure Island, FL: StatPearls Publishing; 2021. https://www.ncbi.nlm.nih.gov/books/NBK532897. Accessed January 6, 2022.
5. Wilson L, Kapp S, Santamaria N. The direct cost of pressure injuries in an Australian residential aged care setting. *Int Wound J*. 2019;16(1):64-70. https://onlinelibrary.wiley.com/doi/full/10.1111/iwj.12992. Accessed January 10, 2022.
6. Rodgers K, Sim J, Clifton R. Systematic review of pressure injury prevalence in Australian and New Zealand Hospitals. *Collegian*. 2021;28(3):310-323. https://www.sciencedirect.com/science/article/abs/pii/S1322769620301177. Accessed January 10, 2022.
7. VanGlider A, Cox J, Edsberg L, Koloms K. Pressure injury prevalence in acute care hospitals with unit-specific analysis. *J Wound Ostomy Continence Nurs*. 2021;48(6):492-503. doi:10.1097/WON.0000000000000817.
8. European Pressure Ulcer Advisory Panel, National Pressure Injury Advisory Panel, and Pan Pacific Pressure Injury Alliance. Prevention and treatment of pressure ulcers/injuries: quick reference guide. https://www.internationalguideline.com/static/pdfs/Quick_Reference_Guide-10Mar2019.pdf. Published 2019. Accessed October 20, 2021.
9. Wounds UK. Consensus document 2017. Recognizing, management and preventing deep tissue injury (DTI). https://www.wounds-uk.com/resources/details/recognising-managing-and-preventing-deep-tissue-injurydti. Accessed October 20, 2021.
10. Australian Commission on Safety and Quality in Healthcare (ACSQHC). *National Safety and Quality Health Service Standards*. 2nd ed. Sydney, NSW, Australia: ACSQHC; 2017. https:/www.safetyandquality.gov.au/sites/default/files/migrated/National-Safety-and-Quality-Health-Service-Standards-second-edition.pdf. Accessed October 15, 2021.
11. Victorian Agency for Health Information: Safer Care Victoria. Victorian Health Incident Management System (VHIMS). https://www.bettersafercare.vic.gov.au/notify-us/vhims. Published 2021. Accessed June 9, 2021.
12. Garcia-Fernandez FP, Pancorbo-Hidalgo PL, Agreda JJ. Predictive capacity of risk assessment scales and clinical judgment for pressure ulcers: a meta-analysis. *J Wound Ostomy Continence Nurs*. 2014;41(1):24-34.
13. Rondinelli J, Zuniga S, Kipnis P, Kaware LN, Liu V, Escobar GJ. Hospital-acquired pressure injury. Risk-adjusted comparisons in an integrated healthcare delivery system. *Nurse Res*. 2018;67(1):16-25. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6013055. Accessed October 21, 2021.
14. Kayser SA, VanGilder CA, Lchenbruch C. Predictors of superficial and severe hospital-acquired pressure injuries: a cross-sectional study using the International Pressure Ulcer Prevalence survey. *Int J Nurs Stud*. 2019;89:46-52. https://www.researchgate.net/publication/327532803_Predictors_of_Superficial_and_Severe_Hospital-acquired_Pressure_Injuries_A_Cross-Sectional_Study_Using_the_International_Pressure_Ulcer_Prevalence_Survey. Accessed November 11, 2021.
15. Honaker J, Brockopp D, Moe K. Suspected deep tissue injury profile: a pilot study. *Adv Skin Wound Care*. 2014;27(3):133-142. doi:10.1097/01.ASW.0000443267.25288.87.
16. VanGilder C, MacFarlane GD, Harrison P, et al. The demographics of suspected deep tissue injury in the United States: an analysis of the International Pressure Ulcer Prevalence Survey 2006-2009. *Adv Skin Wound Care.* 2010;23(6):254-261.
17. Salcido R, Lee A, Ahn C. Heel pressure ulcers purple heel and deep tissue injury. *Adv Skin Wound Care*. 2011;24(8):374-382. https://journals.lww.com/aswcjournal/Fulltext/2011/08000/Heel_Pressure_Ulcers__Purple_Heel_and_Deep_Tissue.7.aspx. Accessed November 11, 2021.
18. Sookyung H, Li X, Vermillion B, et al. Body mass index and pressure ulcers: improved predictability of pressure ulcers in intensive care patients. *Am J Crit Care.* 2014;23(6):494-501. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4385001. Accessed January 11, 2022.
19. Corniello AL, Moyse T, Bates J, Karafa M, Hollis C, Albert NM. Predictors of pressure ulcer development in patients with vascular disease. *J Vasc Nurse*. 2014;32(2):55-62.
20. Delmore B, Lebovits S, Suggs B, Rolnitzky L, Ayello EA. Risk factors associated with heel pressure ulcers in hospitalized patients. *J Wound Ostomy Continence Nurs.* 2015;42(3):242-248.
21. Bonham PA, Brunette G, Crestodina L, et al. 2021 guideline for management of patients with lower-extremity wounds due to diabetes mellitus and/or neuropathic disease: an executive summary. *J Wound Ostomy Continence Nurs*. 2022;49(3):267-285.
22. Shi C, Dumville JC, Cullum N, Rhodes S, Jammali-Blasi A, McInnes E. Alternating pressure (active) air surfaces for preventing pressure ulcers. *Cochrane Database Syst Rev*. 2021;5(5):CD013620. https://www.cochranelibrary.com/cdsr/doi/10.1002/14651858.CD013620.pub2/full. Accessed January 13, 2022.
23. Gillespie BM, Walker RM, Latimer SL, et al. Repositioning for pressure injury prevention in adults. *Cochrane Database Syst Rev*. 2020;6(6):CD009958. https://www.cochranelibrary.com/cdsr/doi/10.1002/14651858.CD009958.pub3/full. Accessed January 10, 2022.

INSTRUCTIONS

Incidence and Characteristics of Suspected Deep Tissue Pressure Injuries on the Foot and Ankle: A Retrospective Study

TEST INSTRUCTIONS

- Read the article. The test for this nursing continuing professional development (NCPD) activity is to be taken online at **www.NursingCenter.com/CE/JWOCN**. Tests can no longer be mailed or faxed.
- You'll need to create an account (it's free!) and log in to access My Planner before taking online tests. Your planner will keep track of all your Lippincott Professional Development online NCPD activities for you.
- There's only one correct answer for each question. A passing score for this test is 7 correct answers. If you pass, you can print your certificate of earned contact hours and access the answer key. If you fail, you have the option of taking the test again at no additional cost.
- For questions, contact Lippincott Professional Development: 1-800-787-8985.
- Registration deadline is December 5, 2025.

PROVIDER ACCREDITATION

Lippincott Professional Development will award 2.0 contact hours for this nursing continuing professional development activity.

Lippincott Professional Development is accredited as a provider of nursing continuing professional development by the American Nurses Credentialing Center's Commission on Accreditation.

This activity is also provider approved by the California Board of Registered Nursing, Provider Number CEP 11749 for 2.0 contact hours. Lippincott Professional Development is also an approved provider of continuing nursing education by the District of Columbia, Georgia, West Virginia, New Mexico, South Carolina, and Florida, CE Broker #50-1223. Your certificate is valid in all states.

Payment: The registration fee for this test is FREE for members and $21.95 for nonmembers.

DOI: 10.1097/WON.0000000000000970