



Foot Problems in Patients in Acute Care

A Point-Prevalence Survey

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ABSTRACT

PURPOSE: Determine the prevalence of foot problems in an inpatient population and to describe demographic data, comorbid conditions, and type of footwear worn.

DESIGN: Observational point-prevalence cross-sectional design.

SUBJECTS AND SETTING: The study setting was a 722-bed licensed hospital in Western Australia. A convenience sampling was used to include adults hospitalized in the study setting during the period of data collection.

METHODS: A subset of foot questions, guided by a literature review, and input from foot, wound, diabetes, and psychometric researchers and clinicians, was incorporated into the hospital point-prevalence survey conducted annually for nursing safety and quality. Trained nurses collected data during the 1-day survey. Data were analyzed using descriptive statistics and 2-tailed tests; associations between study variables were analyzed.

RESULTS: Two hundred twenty-one patients participated in the survey; a majority ($n = 193$, 87%) self-reported at least 1 foot problem. More than half ($n = 124$) reported 3 foot problems and nearly one-third ($n = 67$) had 5 or more foot problems. Thick nails, damaged nails, and calluses and corns were the most frequently occurring foot problems. Older participants were more likely to have certain foot problems such as calluses and thick nails. Eleven (5%) participants were admitted to the hospital for a foot-related condition.

CONCLUSION: The majority of foot problems in our study were found to be minor and not the primary admitting diagnosis. However, even minor foot problems can pose a risk of worsening, especially in high-risk populations such as those with diabetes. Thus, detection is critical in overall patient assessment, and nurses play a critical role in assessment and management of minor foot problems through the delivery of skin and nail care and through collaboration with other professionals who provide specialized foot care.

KEY WORDS: Foot, Foot deformities, Foot dermatoses, Foot injuries, Hospitalization, Inpatients, Nursing care, Patient care.

INTRODUCTION

The human foot is a complex structure and plays multiple functional roles, which place the foot at high risk of injury.¹ In addition, several systemic conditions and chronic diseases such as diabetes; renal, cardiovascular, and peripheral vascular disorders, cancer, and arthritis can have a negative impact on foot

health.^{2,3} A significant proportion of hospital beds are occupied by patients with foot problems and a growing body of the literature suggests that foot conditions are a primary reason for hospitalization.^{4,7} Foot problems are reported to affect 7.4% of total patient admissions, comparable to hospitalization rates for chronic renal disease and cerebrovascular disease.^{2,8,9} For those admitted with other primary conditions, a substantial number of foot problems go undetected during hospitalization, which may affect 11.8% of all inpatients admissions; an additional 25% of these patients are at high risk for developing foot problems.^{2,3,9}

Traditionally, attention is paid to foot problems secondarily following admission for other conditions, chiefly, diabetes.³ Diabetes is a main cause of lower limb amputation, and often these amputations are preceded by foot ulcers. A systematic review of foot problems among the general inpatient population reported that only 13 out of 78 studies examined foot problems as the primary condition of interest.² This finding suggests that many patients without and with diabetes and foot problems may be missed and is further supported by findings from a multisite study in which individuals with diabetes represented only 28% of hospitalizations for foot problems.⁸ Studies with the primary aim to explore the prevalence and types of foot problems among inpatients have potential to add value to a relatively unexplored area.

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The primary purpose of our study was to determine the prevalence of foot problems in an inpatient population receiving care in a 722-bed licensed hospital in Western Australia. The secondary aims were to describe the population demographics, such as primary diagnosis, comorbidities, age, and sex, and establish a foot profile that included history of foot problems and type of footwear worn.

METHODS

This study was an observational cross-sectional point-prevalence survey (PPS) aimed to monitor compliance with the criteria relating to the National Safety and Quality Health Services (NSQHS) standards and identify opportunities for improvement. For our part of the survey, we added foot-specific questions developed by our study team. All hospitalized adult patients older than 18 years who were inpatients for at least 24 hours, able to read and write in English, and willing to be interviewed and examined were invited to participate in the PPS. A working group was formed to determine the PPS survey processes and included hospital senior staff including clinical nurse managers. Each general ward/unit clinical nurse manager with a census of at least 20 patients, less for specialty areas that had lower bed numbers, was asked to nominate a nurse from his or her unit to participate in data collection for the PPS. The PPS is an annual activity that provides data for an institutional “self-assessment” of care provided to patients that guide improvements to meet NSQHS requirements. The NSQHS includes 8 standards aimed to enhance the quality of healthcare across Australia, with the overall goal to protect the public from harm.¹⁰ The investigators of our study were not included in this initial step.

Foot Survey

The foot portion of the PPS was developed by the research team and was underpinned by evidence-based practices reported in the literature pertaining to foot assessment, footwear, and specific demographic data and medical history.^{2,3,8,9,11} The research team included 3 expert researchers with backgrounds in psychometrics, chronic conditions, and self- and diabetes management (M.A., L.W., A.T.B.), and 2 clinical nurses including a diabetes educator nurse and wound care nurse. After the initial foot survey was developed, the study nurses who were to collect data from the hospital participants were asked to review the survey items for additional input for clarity. Based on their input, the final survey included 55 items divided into 4 sections: demographics (4 items), health history (24 items), foot assessment (divided into 4 subsections), and footwear (3 items). The foot assessment subsections included foot history (5 items), foot review (4 interview items), foot inspection (10 observation items), and foot palpation for temperature and pulses (5 items). The 55 foot-related items were incorporated into the hospital PPS that aimed to examine adherence to the 8 NSQHS standards.

Procedure

Twenty-two nurses who were nominated by their managers and agreed to collect data were trained on survey procedures. Data were collected on August 30, 2017. These nurses attended an hour-long education session that included training videos and slides on foot assessment. On the day of the survey, copies of the education session material were made available as supplemental resources for the nurses. In addition, 2 researchers (M.A., A.T.B.) were on the site to answer any questions.

The evening before the survey day, a participant information sheet and the PPS were circulated to eligible patients. The information sheet introduced the purpose of the survey, what the participation in the foot portion of the survey would involve, how the data would be collected, and human subjects concerns such as where data will be stored, and the risks and potential benefits. On the day of data collection, patients who responded to the hospital PPS questions were asked whether they had a chance to read the provided information sheet. If so, the patients were asked whether they had any questions and whether willing to participate in the foot-related part of the survey. If the patients said “No,” they were asked to sign an opt-out form.

By the end of the day, data from all completed surveys were entered into an Excel spreadsheet by the hospital clinical governance unit for data analysis.

Ethical Considerations

The hospital human research ethics committee approved the study (#1724, August 21, 2017) and was accepted by the affiliated university ethics board (project 18814, August 29, 2017). Participation was voluntarily; those who provided verbal informed consent were included in the study.

Data Analysis

Data were analyzed using SPSS statistical software, Version 24.0 (Statistical Package of Social Sciences, Armonk, New York) and included frequencies, descriptive statistics, and Pearson Test of Independence to test for statistically significant associations between variables. These variables included age group, existing comorbid conditions, foot problems, and advice to wear special footwear (Table 1). All tests were 2-tailed and considered statistically significant at *P* values less than .05. Content analysis was employed to evaluate responses to the open-ended questions. Similar responses were aggregated, coded, and then frequencies were computed.

RESULTS

Seventeen units in the hospital participated in the survey in which the information sheet and surveys were distributed to eligible patients; 257 patients were invited to participate in foot section of the survey. Of those 257, 30 patients opted out the study, and 4 were unable to consent for a total sample of 223 participants of which 221 (male: *n* = 77, female: *n* = 138) were screened eligible (Table 2). The mean age of participants was 68.8 (median: 74, SD: 20.02) years and age range was 18 to 97 years. More than half of the participants were older than 70 years (*n* = 125, 58.9%). Almost half identified as Australian. The majority of participants (*n* = 177, 80.1%) were nonsmokers and of these, 63 (28.5%) had a prior history of smoking and 114 (51.6%) had never smoked. The most frequent reasons for admission were related to medical conditions, followed by surgical procedures, orthopedic conditions, and then orthopedic surgery (Table 2). Of those admitted due to falls (*n* = 16), the majority (*n* = 14, 87.5%) were older than 80 years.

The large number of participants (*n* = 204, 92.3%) had at least 1 comorbid condition. The most frequent comorbidities were vision impairment, hypertension, mobility impairment, and arthritis. The number of comorbid conditions increased with age, and the association between age and number of comorbidities was statistically significant (*P* = .001) (Table 1).

TABLE 1.
Statistically Significant Associations Between Study Variables

Variables	df	N	Value	P
Age group and existing comorbidities				
Age and number of comorbidities	12	212	68.29	.001
Arthritis	8	212	22.248	.004
Dyslipidemia	8	206	23.997	.002
Mobility impairment	8	212	39.505	.001
Cerebrovascular accident	8	208	18.472	.018
Hypertension	8	210	40.564	.001
Vision impairment	8	210	37.084	.001
Diabetes and other comorbidities				
Diabetes and number of comorbidities	3	220	14.686	.002
Diabetes and arthritis	2	219	8.564	.014
Diabetes and dyslipidemia	2	214	7.420	.017
Diabetes and mobility impairment	2	220	6.250	.044
Diabetes and hypertension	2	218	.6006	.05
Diabetes and peripheral artery disease	2	217	12.388	.002
Diabetes and renal diseases	2	218	8.756	.013
Comorbidities and foot problems				
Diabetes and changes in foot sensation	1	213	4.456	.035
Diabetes and pain at night or at rest	1	212	4.767	.029
Dyslipidemia and changes in foot sensation	2	207	8.186	.017
Cerebrovascular accident and changes in foot sensation	2	209	8.129	.017
Depression and changes in foot sensation	2	210	12.718	.002
Trauma and changes in foot sensation	1	208	8.828	.003
Neuropathy and changes in foot sensation	2	211	56.646	.001
Ischemic heart disease and changes in foot sensation	2	210	9.138	.010
Peripheral artery disease and changes in foot sensation	2	210	13.388	.001
Arthritis and foot deformity	6	217	15.001	.005
Mobility impairment and erythema	4	219	16.026	.003
Mobility impairment and well-kept nails	4	218	11.352	.023
Mobility impairment and thick nails	4	218	20.579	.001
Mobility impairment and damaged nails	4	219	18.108	.001
Hypertension and erythema	4	217	9.929	.042
Hypertension and thick nails	4	216	16.446	.002
Depression and thick nails	4	215	12.240	.016
Ischemic heart disease and well-kept nails	4	215	11.431	.022
Ischemic heart disease and damaged nails	4	216	14.071	.007
Comorbidities and foot problems				
Number of comorbidities and thick nails	6	219	12.371	.048
Number of comorbidities and damaged nails	6	220	14.875	.021
Number of comorbidities and foot cramping when walking or exercising	9	221	21.942	.011
Age and existing foot problems				
Erythema	8	211	20.970	.007
Calluses or corns	8	211	18.021	.021
Deformity	8	210	22.629	.004
Well-kept nails	8	210	21.415	.006
Thick nails	8	210	44.872	.001
Damaged nails	8	211	26.569	.001

(continues)

TABLE 1.
Statistically Significant Associations Between Study Variables (Continued)

Variables	df	N	Value	P
Footwear and foot problems				
Advice to wear special foot wear and changes to foot sensation	9	198	143.217	.001
Advice to wear special foot wear and pain at rest or at night	1	194	6.550	.010

Of those participants who were diagnosed with diabetes (type 1 [$n = 2$, 4.5%] and type 2 [$n = 41$, 93.2%]), the duration of diabetes was more and less than 10 years for 10 (23.26%) and 19 (43.18%) participants, respectively. One participant denied the diagnosis of diabetes. In the case of 1 participant, diabetes was discovered in the current admission. Diabetes du-

ration was not recorded for 10 participants. Only 10 of the 42 participants with diabetes reported taking medication for diabetes and nearly half ($n = 20$) of those with diabetes reported knowledge of glycosylated hemoglobin (HbA_{1c}). Of these 20 participants, 8 knew their HbA_{1c} level. Participants with diabetes were statistically significantly ($P = .002$) more likely to

TABLE 2.
Participants' Profile (N = 221)

Variables	N	%
<i>Demographics</i>		
Gender		
Male	77	34.84
Female	138	62.44
Age group, y		
<50	40	18.1
50-59	20	9.0
60-69	27	12.2
70-79	39	17.6
80+	86	38.9
Total	212	95.9
Background		
Australian	109	49.3
British	36	16.3
Other European	15	6.8
New Zealand	8	3.6
Asian	7	3.2
South African	7	3.2
White	5	2.3
Aboriginal	2	0.9
Other	2	0.9
Not recorded	30	13.6
Total	221	100
Smoking history		
Never smoked	114	51.6
Past smoker	63	28.5
Current smoker	31	14
Smoking status undetermined	10	4.5
<i>Health profile</i>		
Reason for hospital admission		
Medical	75	33.9
Surgical	41	18.6
Orthopedic	22	10.0
Orthopedic surgery	18	8.1

(continues)

TABLE 2.
Participants' Profile (N = 221) (Continued)

Variables	N	%
Medical/surgical	18	8.1
Maternity	7	3.2
Psychiatry	5	2.3
Other	2	.9
Unclear	1	.5
Unknown/not recorded	32	14.5
Total	221	100.0
Preexisting comorbidities		
Vision impairment	132	59.7
Hypertension	113	51.1
Mobility impairment	101	45.7
Arthritis	100	45.2
Trauma	63	28.5
Depression	58	26.2
Ischemic heart diseases	53	24
Neuropathy	50	22.6
Cancer	45	20.4
Diabetes	44	19.9
Dyslipidemia	43	19.5
Cerebrovascular accident	32	14.5
Peripheral artery disease	23	10.4
Vascular surgery	22	10
Renal diseases	12	5.4
Number of comorbidities		
No comorbidities	17	7.7
1 comorbid condition	26	11.8
2 comorbid conditions	23	10.4
3+ comorbid conditions	155	70.1
Total	221	100.0
Diabetes comorbidities		
No comorbidities	0	0
1 comorbid condition	1	2.27
2 comorbid conditions	3	6.8
3+ comorbid conditions	40	90.9
Total	44	100

have more comorbid conditions (Table 1). With the exception of cancer, the number of comorbidities was higher in participants with diabetes.

Foot-Related Data

The majority of the 221 participants in our sample reported at least 1 foot problem ($n = 193$, 87.3%), and more than half ($n = 124$) reported 3 foot problems and one-third ($n = 67$) reported 5 problems or more. Eleven (5%) participants were admitted with current foot-related problems such as fractures ($n = 3$, 1.3%), edema ($n = 2$, 1%), infection ranging from cellulitis to gangrene ($n = 4$, 2%), toe injury ($n = 1$, 0.5%), and foot pain ($n = 1$, 0.5%). Fourteen (6.3%) reported a previous foot-related hospital admission. Nine (4.0%) participants reported a history of a previously healed foot ulcer. There were 6 (2.7%) participants with an unhealed foot ulcer and 5 (2.2%) who had a previous lower limb amputation.

Foot Assessment

A small group of participants ($n = 23$, 10.0%) reported experiencing co-occurring changes in foot sensation, pain at night or at rest, and cramping during walking or exercise. In the larger sample, less than a quarter ($n = 52$, 23.5%) of the participants

reported changes in foot sensation, and an equal number of participants ($n = 50$, 22.6%) reported pain at night or at rest, and cramping during walking or exercise. Participants with diabetes were more likely to report changes in foot sensation or pain at night or at rest than those without diabetes, and both of these associations were statistically significant with P values of .035 and .029, respectively (Table 1). There was a statistically significant association ($P = .021$) between the number of comorbidities and foot cramping when walking or exercising but not for any particular comorbidity. There were no statistically significant associations between foot sensation, pain at night, pain at rest, cramping during walking, and exercising by age group or sex.

Most participants had well-kept nails defined as nails that were nicely trimmed with no evidence of problems such as thickness (Figure). Photographs were used during the training sessions as a visual illustration of what is meant by well-kept nails. The association between well-kept nails and younger age was statistically significant ($P = .006$) (Table 1). In line with this result, older participants were statistically more likely to have foot problems. Table 1 summarizes these problems with corresponding P values. Thick nails or damaged nails were statistically more likely to be seen among those with 3 or more

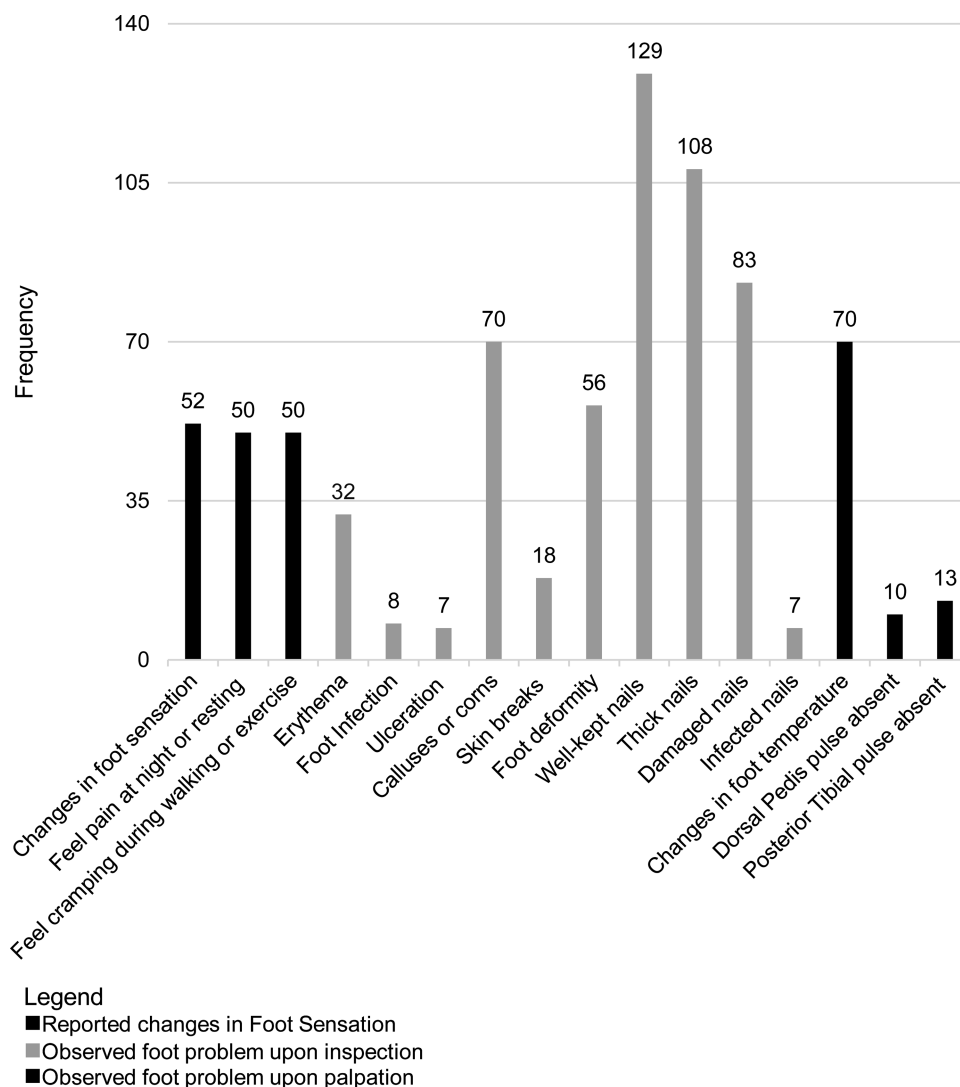


Figure. Foot problems frequencies and percentages.

TABLE 3.
Footwear Responses

Code	Response	N	%
Open/closed toe shoes	Closed-toe shoes	106	47.96
	Open-toe shoes	27	12.21
	Both open and closed shoes	14	6.3
Slip-on/laced shoes	Slip-on shoes	55	24.9
	Lace-up shoes	15	6.8
	Both laced-up and slip-on shoes	17	7.7
Flat/heeled shoes	Flat shoes	112	50.7
	Heeled shoes	13	5.9
Others	Brand-named shoes	28	12.7
	Orthotic shoes	8	3.6
	Goes barefoot	5	2.26
	Bedbound/uses walking sticks	2	0.9
	Velcro-fastened shoes	1	0.5

comorbidities, with *P* values of .048 and .021, respectively. During assessment, thick nails, damaged nails, and calluses and corns were the most frequently occurring foot problems whereas foot infections, infected nails, and ulceration were the least common observations (Figure).

When feet were palpated for assessment of temperature using the back of the nurse's hand, 52 (23.5%) participants had cold feet, 2 (1%) had hot feet, and 16 (7.2%) participants had feet of uneven temperature. Most participants had warm feet (*n* = 151, 68.3%), considered a normal finding. Dorsalis pedis (*n* = 200, 90.5%) and posterior tibial (*n* = 185, 83.7%) pulses were palpable; pulses were absent in 6 (3%) and 11 (5%), respectively. There was no statistically significant association found between foot temperature and any comorbidity, age group, or sex; these findings were also noted for the presence or absence of a dorsalis pedis or posterior tibial pulses.

Footwear Assessment Questions

Participants (*n* = 208, 94%) gave verbal responses to items related to the type of footwear they normally wore. Flat and closed-in shoes were the types of shoes most frequently worn (Table 3). The types of shoes in the category named "other" were brand-named shoes, which come in many different styles and included shoes participants described as "comfortable" and "normal."

When asked whether they had received advice to wear special shoes, 45 participants (20.4 %) reported that they had received such advice, 28 indicated that they follow the advice, and 13 did not follow recommendations. The reasons for not following advice included shoes were too uncomfortable, too heavy and unstable, or too expensive. One participant reported falling over when wearing a special boot and 1 participant reported trying orthotics but did not like them. Advice to participants to wear special shoes was more likely to be provided if participants had noticed changes to their foot sensation (*P* = .001) or experienced foot pain at rest or at night (*P* = .010). There was no association between type of footwear worn and comorbidity, age group, and sex. This was the case of the association between advice to wear special shoes or if that advice was followed and comorbidity, age group, and sex.

DISCUSSION

This PPS of inpatients who agreed to participate in our study contributes to the evidence base of the prevalence of foot problems among hospital inpatients. We found that the vast majority of participants experienced 1 or more foot problems; however, the majority were minor and not the cause of hospitalization. Eleven (5%) of 221 patients in our sample were hospitalized specifically for a foot problem, a prevalence rate consistent with 5% reported in a systematic review and a meta-analysis.² However, it was noted in the systematic review that the heterogeneity of the included studies and drawbacks in the search strategy may have resulted in an underestimation of inpatients hospitalized for foot problems. In a previous study, foot problems were notably higher as the primary reason for 12.5% of admissions to a subacute rehabilitation facility¹¹ and slightly lower (7.4%) in a multisite study of patients admitted to acute care.⁸ The methodological differences (single vs multiple types of settings); hospitals types such as acute, subacute, and specialty; and location of hospitals (rural, urban, regional) between studies can be considered reasonable explanations for the differences in percentages of patients hospitalized primarily for foot problems. Differences in prevalence may also be attributed to times of data collection; our data were collected during 1 day whereas data from the subacute rehabilitation facility's study data were collected over 2 different 4-week time periods. Finally, trained nurses collected data in our study whereas podiatrists collected data in the other 2 studies; 1 podiatrist in the subacute rehabilitation facility and a team of 27 podiatrists plus podiatry students in the final year of study collected the multisite point prevalence study data. These variations may explain the variations in the reported results. Research on foot problems among inpatients is limited, making it difficult to compare our results.

The risk factors among our inpatient population for developing foot problems, including peripheral artery disease, peripheral neuropathy, and foot deformity, are consistent with findings from the previously cited studies.^{2,8,11} For example, peripheral neuropathy was similar across the 3 studies; it was 22.6% (*n* = 50) for our study, 22% (*n* = 160) for the multisite study, and 24.7% (*n* = 21) for the subacute care rehabilitation facility study.

We found that the majority of foot problems were minor and not the cause of hospitalization. The most prevalence conditions were thick nails, damaged nails, and calluses and corns. Older participants were more likely to have these 4 minor foot problems and were also found to have erythematous feet and foot deformities. Age is a well-documented risk factor for foot problems; data from a systematic review showed that nearly every older adult experienced some type of foot problem with 14% to 53% of the older adult population experiencing on average 3 foot problems.¹² In our survey, we did not examine the frequency of foot problems by age group. However, nearly 70% of the study population were aged 60 years or older, suggesting that older individuals are more likely to have multiple foot problems, suggesting the need to pay special attention to foot problems among older adult population.¹²⁻¹⁴ A substantial percentage of inpatients have foot problems that remain unrecognized.^{2,9}

Unfortunately, even minor unrecognized problems can lead to complications such as foot ulcers that require complex and costly treatment.¹⁴⁻¹⁶ Although nurses are in a unique position to identify minor foot problems before further deterioration,

many consider their clinical skills inadequate to assess and manage foot problems.¹² Foot care is within the scope of nursing practice and guideline-guided foot care has shown to prevent and/or reduce foot complications, for example, associated with diabetes.¹⁷⁻²⁰ More complex foot conditions should be managed in collaboration with or referral to foot care specialists (podiatrists/chiropractors).²¹⁻²³

Our results showed a statistically significant association between minor foot problems and other conditions such as mobility impairment, hypertension, and ischemic heart disease, consistent with findings in the literature.² We found a statistically significant association between diabetes and poor foot sensation, pain at night or at rest, and cramping during walking or exercise. The study results showed that 20% (n = 44) of participants had diabetes; however, a greater number of participants were noted to have other conditions such as hypertension and arthritis.

Foot problems are posited to be associated with inappropriate footwear; however, in our study, we did not find an association between type of footwear and comorbid conditions. Nonetheless, it is important to incorporate footwear-related advice in the treatment plan for individuals with diabetes and other conditions such as arthritis and those with mobility impairments.²⁴ We also did not find associations among footwear, foot problems, age, and sex. These findings differ from results of a previous secondary analysis of inpatient data that established a statistically significant association between sex and selected footwear types.²⁴ These variations could be attributed to the methodological differences including the way of classifying the footwear. In the present study, the participants provided verbal responses concerning their footwear and footwear types were coded inductively. In the study cited previously, the participants were asked to indicate their outdoor footwear on a given chart containing footwear pictures.²⁴

Strengths and Limitations

The strengths of this study include the development of survey questions specific to foot problems experienced by an inpatient population, derived from the literature, and validated by expert researchers and clinicians with expertise in wound or foot care, psychometrics, and diabetes. The study included a relatively large number of participants. This study has several limitations. A large number of nurses (n = 22) collected data across the hospital. This introduces possibilities for variations in data collection despite the provision of education on data collection. Importantly, data on the survey did not include document audit and thus cannot confirm whether the identified foot conditions were recorded in the patient notes. The data were collected as part of the hospital PPS, recorded from the survey into spreadsheet, and then foot-related data were extracted and uploaded to SPSS for analysis for our study. The researchers were not able to cross-check the data for possible errors.

CONCLUSION

Our study findings contribute to the literature and shed light on the types and frequency foot problems experienced by a hospitalized cohort of patients. In addition, these data support results of previous research that suggests that foot problems are common among hospitalized patients. The majority of those foot problems are minor and not the reason for hospitalization, which raises concern that foot problems in high-risk populations such as those with diabetes or arthritis may

remain unidentified and worsen during hospitalization due to the nature of the condition(s) for which the patient was admitted. Nurses can play a pivotal role in managing minor foot problems through skin and nail assessment and care and timely referral to healthcare professionals for specialized foot care when appropriate. We recommend that all inpatient settings have a protocol in place, guided by the evidence, which would enhance the identification of previously unrecognized foot problems and the provision of appropriate treatment within a timely manner.

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REFERENCES

1. Wright WG, Ivanenko YP, Gurfinkel VS. Foot anatomy specialization for postural sensation and control. *J Neurophysiol.* 2012;107(5):1513-1521. doi:10.1152/jn.00256.2011.
2. Lazzarini PA, Hurn SE, Fernando ME, et al. Prevalence of foot disease and risk factors in general inpatient populations: a systematic review and meta-analysis. *BMJ Open.* 2015;5(11):e008544. doi:10.1136/bmjopen-2015-008544.
3. Lazzarini PA, Hurn SE, Kuys SS, Kamp MC, Reed L. Foot-related conditions in hospitalised populations: a literature review. *Wound Pract Res.* 2016;24(1):16-35.
4. Lazzarini PA, Gurr JM, Rogers JR, Schox A, Bergin SM. Diabetes foot disease: the Cinderella of Australian diabetes management? *J Foot Ankle Res.* 2012;5(1):24. doi:10.1186/1757-1146-5-24.
5. Kaminski M, Frescos N, Tucker S. Prevalence of risk factors for foot ulceration in patients with end-stage renal disease on haemodialysis. *Intern Med J.* 2012;42(6):e120-e128. doi:10.1111/j.1445-5994.2011.02605.x.
6. Vangilder C, Macfarlane GD, Meyer S. Results of nine international pressure ulcer prevalence surveys: 1989 to 2005. *Ostomy Wound Manage.* 2008;54(2):40-54.
7. Ahmad J. The diabetic foot. *Diabetes Metab Syndr.* 2016;10(1):48-60. doi:10.1016/j.dsx.2015.04.002.
8. Lazzarini PA, Hurn SE, Kuys SS, et al. Direct inpatient burden caused by foot-related conditions: a multisite point-prevalence study. *BMJ Open.* 2016;6(6):e010811. doi:10.1136/bmjopen-2015-010811.
9. Lazzarini PA, Hurn SE, Kuys SS, et al. The silent overall burden of foot disease in a representative hospitalised population. *Int Wound J.* 2017;14(4):716-728. doi:10.1111/iwj.12683.
10. Australian Commission on Safety and Quality in Health Care (the Commission). The NSQHS standards. . <https://www.safetyandquality.gov.au/standards/nsqhs-standards>. Published 2019. Accessed March 15, 2020.
11. Earl BJ, Lazzarini PA, Kinnear EM, Cornwell PL. Prevalence of active foot disease and foot disease risk factors in a subacute inpatient rehabilitation facility: a cross-sectional prevalence study. *J Foot Ankle Res.* 2014;7(1):41. doi:10.1186/s13047-014-0041-x.
12. Stolt M, Suhonen R, Voutilainen P, Leino-Kilpi H. Foot health in older people and the nurses' role in foot health care—a review of literature. *Scand J Caring Sci.* 2010;24(1):194-201. doi:10.1111/j.1471-6712.2009.00700.x.
13. Barwick AL, Van Netten JJ, Reed LF, Lazzarini PA. Independent factors associated with wearing different types of outdoor footwear in a representative inpatient population: a cross-sectional study. *J Foot Ankle Res.* 2018;11:19. doi:10.1186/s13047-018-0260-7.
14. Stolt M, Suhonen R, Puukka P, Viitanen M, Voutilainen P, Leino-Kilpi H. Nurses' foot care activities in home health care. *Geriatr Nurs.* 2013;34(6):491-497. doi:10.1016/j.gerinurse.2013.08.003.
15. Bryant JL. Preventive foot care program: a nursing perspective. *Ostomy Wound Manage.* 1995;41(4):28-30, 32-24.
16. Lai T, Chan K, Chung S. Foot problems among elderly people in Hong Kong. *AJGG.* 2014;9(2):71-73.
17. NSW Nurses & Midwives' Association. Guidelines on provision of basic foot care by nurses. <http://www.nswnma.asn.au/wp-content/>

- uploads/2013/07/NSWNMA-Guidelines-on-Provision-of-Basic-Foot-Care-by-Nurses.pdf. Published 2017.
18. Howell M, Thirlaway S. Integrating foot care into the everyday clinical practice of nurses. *Br J Nurs*. 2004;13(8):470-473. doi:10.12968/bjon.2004.13.8.12785.
 19. Van Netten J, Lazzarini P, Fitridge R, et al. *Australian Diabetes-Related Foot Disease Strategy 2018-2022: The First Step Towards Ending Avoidable Amputations Within a Generation*. Brisbane, Australia: Diabetic Foot Australia, Wound Management CRC; 2017.
 20. Etnyre A, Zarate-Abbott P, Roehrick L, Farmer S. The role of certified foot and nail care nurses in the prevention of lower extremity amputation. *J Wound Ostomy Continence Nurse*. 2011;38(3):242-251; quiz 252-243. doi:10.1097/WON.0b013e3182152e93.
 21. Buescher TL. Community outreach foot care for the elderly: a winning proposition. *Home Healthc Nurse*. 1998;16(1):37-44.
 22. Firth J, Siddle H. Management of foot ulceration in patients with rheumatoid arthritis. *Nurs Stand*. 2009;23(24):62, 64-66, 68 passim.
 23. Obrien J, Dixon K, Carroll T. Advanced foot care: identification, implementation, and sustainment of a successful program. WOCN society's 49th annual conference, Salt Lake City, Utah, May 19-23, 2017. *J Wound Ostomy Continence Nurse*. 2017;44(S32). doi:10.1097/WON.0000000000000331.
 24. Stolt M, Suhonen R, Puukka P, Viitanen M, Voutilainen P, Leino-Kilpi H. Foot health and self-care activities of older people in home care. *J Clin Nurs*. 2012;21(21-22):3082-3095. doi:10.1111/j.1365-2702.2012.04223.x.

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