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ORIGINAL ARTICLE

The silent overall burden of foot disease in a representative hospitalised population

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Abstract

The aims of this study were to investigate the point prevalence, and associated independent factors, for foot disease (ulcers, infections and ischaemia) in a representative hospitalised population. We included 733 (83%) of 883 eligible adult inpatients across five representative Australian hospitals on one day. We collected an extensive range of self-reported characteristics from participants. We examined all participants to clinically diagnose foot disease (ulcers, infections and ischaemia) and amputation procedures. Overall, 72 participants (9·8%) [95% confidence interval (CI):7·2–11·3%] had foot disease. Foot ulcers, in 49 participants (6·7%), were independently associated with peripheral neuropathy, peripheral arterial disease, previous foot ulcers, trauma and past surgeon treatment ($P < 0·05$). Foot infections, in 24 (3·3%), were independently associated with previous foot ulcers, trauma and past surgeon treatment ($P < 0·01$). Ischaemia, in 33 (4·5%), was independently associated with older age, smokers and past surgeon treatment ($P < 0·01$). Amputation procedures, in 14 (1·9%), were independently associated with foot infections ($P < 0·01$). We found that one in every ten inpatients had foot disease, and less than half of those had diabetes. After adjusting for diabetes, factors linked with foot disease were similar to those identified in diabetes-related literature. The overall inpatient foot disease burden is similar in size to well-known medical conditions and should receive similar attention.

Introduction

Foot-related conditions have been frequently reported to be a leading cause of diabetes-related hospitalisation (1–3). Our recent study went a step further and found that foot-related conditions, particularly foot disease, were a leading cause of all hospitalisations (4). We reported that foot-related conditions were the primary reason for hospitalisation in 7·4% of a representative Australian inpatient population (4). Two-thirds of those were for the foot disease disorders of ulcers, infections and ischaemia; whilst the remainder were for foot trauma and amputation (4). While our study was the first to quantify the direct inpatient burden (4), the overall foot-related inpatient burden made up of the direct (causing admission) and indirect

Key Messages

- the prevalence and factors associated with foot disease is well-known in hospitalised patients with diabetes yet unknown in all hospitalised patients

- we examined a representative sample of 733 hospitalised patients in five Australian hospitals to investigate for foot disease and amputation procedures
- foot disease was clinically diagnosed in 10% of all hospitalised patients, and 2% of all patients were recovering from an amputation procedure
- of those with foot disease (ulcers, infections or ischaemia), most did not have diabetes
- foot disease was linked to similar independent factors that have been found in diabetes-related foot disease literature; yet, we adjusted for diabetes

burden (present during admission) remains to be quantified (5,6).

Two recent reviews have interrogated the existing literature investigating the foot-related conditions present in inpatients (5,6). A narrative review confirmed foot disease, specifically foot ulcers, to be the leading foot-related conditions present in both specific and representative inpatient populations (5). Additionally, a systematic review could only identify enough literature to calculate a pooled prevalence estimate for one sub-group of collective foot-related conditions in representative inpatient populations, that is, 4·7% for diabetes-related foot disease in representative inpatient populations (6). However, this pooled prevalence estimate reported very high heterogeneity because of included studies reporting a variety of definitions for foot disease, with none including ischaemia in their definition (6). The contemporary definition of foot disease is now well-recognised to include foot ulcers, infections and ischaemia (4,7). Thus, neither review was able to identify any studies investigating the prevalence, or associated factors, for foot disease or all foot-related conditions in a representative inpatient population (5,6).

In order for policy makers, clinicians and researchers to fully appreciate the overall foot-related inpatient burden, it appears necessary to investigate the common foot-related conditions that are most likely to collectively make up this burden in representative inpatient populations. According to the literature, this burden is most likely to be made up predominantly of foot disease (ulcers, infection and ischaemia), with acute traumatic foot wounds and amputation procedures contributing the rest of this burden (4–6). Thus, the primary aims of this study were to investigate the point prevalence, and associated independent factors, for foot disease (ulcers, infection and ischaemia) present in a representative hospitalised population. The secondary aims were to investigate the point prevalence, and associated independent factors, for major foot-related conditions (foot disease, acute wounds and amputation procedures) present in the same population.

Methods

Study design and settings

This study was part of the Foot Disease in Inpatients Study, a multi-site observational point prevalence study carried out in five public hospitals in Queensland, Australia (4). The five hospitals have been described in detail elsewhere (4). In brief, each hospital was purposively selected to represent one of the five categories of peer-group hospitals in Australia according to the National Health Performance Authority, including a major metropolitan general hospital (>500 beds in South Queensland), a major metropolitan specialist hospital (>500 beds in South Queensland), a major regional general hospital (>200 beds in Central Queensland), a large metropolitan general hospital (>200 beds in South Queensland) and a large regional general hospital (>50 beds in North Queensland) (4). Institutional ethics committees approved this study, and all participants gave written informed consent (4). This study's design, methodology and definitions have been described previously (4).

Participants

Eligible participants were all adult inpatients present on the designated day of data collection at each of the five hospitals. Excluded were those younger than 18 years; cognitively impaired; or in a paediatric, maternity or psychiatric ward (4). Sample size calculations determined that 750 participants were required to adequately power this study (4). Briefly, 1146 inpatients were present during data collection; 883 met the inclusion criteria. and 733 (83%) were included in this study (4).

Variables

The explanatory variables used for this study have been defined in detail elsewhere and included self-reported and clinically diagnosed variables (4). In brief, the self-reported explanatory variables were grouped into demographic (age and gender), social determinant (socioeconomic status, geographical remoteness, education levels achieved, country of birth and Australian indigenous status), medical condition history (diabetes, hypertension, dysiplidaemia, myocardial infarct, cerebrovascular accident, chronic kidney disease, cancer, arthritis, depression, acute foot trauma and smoking history), self-care ability (mobility impairment, vision impairment, main footwear worn outside and main footwear worn inside house) and past foot treatment in the previous 12 months prior to hospitalisation (by podiatrist, general practitioner, specialist physician, surgeon, nurse, orthotists and other) variables (4). Main footwear worn variables were then collapsed into low-risk footwear (walking shoe, runner, oxford shoe, boot or bespoke footwear), moderate-risk footwear (moccasin, Ugg boot, slipper or backless slipper), high-risk footwear (high heels, flip flops, court shoe, mule or sandal) and no footwear (socks only or barefoot) (4). The clinically diagnosed explanatory variables included previous foot ulcer (self-reported with clinical examination to confirm), previous amputation (self-reported with clinical examination to confirm), peripheral neuropathy (absence of sensation to a 10-g monofilament on two or more of three plantar forefoot locations), peripheral arterial disease (absence of at least one foot pulse and a toe systolic pressure <70 mmHg) and foot deformity (three or more of small muscle wastage, bony prominence, prominent metatarsal heads, hammer/claw toes, limited joint mobility and Charcot deformity) on at least one foot (4). Peripheral arterial disease (PAD) was further categorised into mild PAD

Table 1 Definitions for each outcome variable

Outcome variable	Definition
Foot-related conditions (4)	Any foot ulcer, foot infection, ischaemia, acute foot wound or amputation procedure present
Foot disease (4,8)	Any foot ulcer, foot infection or ischaemia present
Foot ulcer (8,9)	An existing full-thickness wound beneath the ankle of primarily neuropathic, ischaemic, pressure injury origin or post-foot ulcer amputation site
Foot infection (8–11)	At least two manifestations of inflammation (purulence, erythema, pain, tenderness, warmth or induration)
Mild foot infection	A foot infection with erythema extending <2 cm from the edge of the wound
Moderate foot infection	A foot infection with erythema extending >2 cm from the edge of the wound
Severe foot infection	Any foot infection with signs of systemic inflammatory response syndrome
Ischaemia (7–9)	At least one absent foot pulse and a toe systolic pressure <30 mmHg
Acute foot wound (8)	An existing full-thickness wound beneath the ankle of primarily traumatic or post-surgical origin (excluding amputation procedures because of foot ulcer)
Amputation procedure (12,13)	A new lower-extremity amputation procedure performed as part of the current inpatient admission, plus a clinical examination to verify a post-surgical amputation wound site
Minor amputation procedure	An amputation procedure distal to the ankle
Major amputation procedure	An amputation procedure proximal to the ankle

(toe systolic pressure of 51–70 mmHg), moderate PAD (toe systolic pressure 31–50 mmHg) and critical PAD/ischaemia (toe systolic pressure <30 mmHg) (4). The outcome variables for this study were clinically diagnosed foot-related conditions, including foot disease disorders (ulcers, infections and ischaemia), acute foot wounds and new amputation procedures. Table 1 outlines the exact detailed criteria, definitions and supporting citations for each outcome variable used in this study (4,7–13).

Data collection

The data collection procedure has been described elsewhere (4). In brief, the Queensland Foot Disease Form (QFDF) (4) was developed from a similar validated data collection instrument (8). The QFDF captured all variables through a survey of participants' self-reported history and a physical examination for clinically diagnosed foot-related conditions (4,8). Data collectors were publicly employed podiatrists who received extensive training and scored at least 90% accuracy on assessment (4). Data were collected by teams of data collectors between 8 am and 5 pm on each hospital's single data collection day between June and December 2013 (4). A 5% subsample of study data collected was tested against audited medical records, and high levels of agreement were reported (4).

Statistical analysis

All data were analysed using SPSS 22·0 for Windows (SPSS Inc., Chicago, IL) or GraphPad Software. Prevalence proportions with 95% confidence intervals (95% CI) were calculated for all outcomes. Differences between groups were tested using χ^2 tests, Kruskal–Wallis tests, *t*-tests or ANOVAs. Univariate logistic regression analyses tested for crude associations with outcomes ($P < 0{\cdot}2$) (14,15). Two multivariate models were used for each outcome: Model 1 used all variables, and Model 2 used all variables except past foot treatment variables. All variables crudely associated in univariate analyses ($P < 0{\cdot}2$) were included in multivariate logistic regression analyses (14,15). A backwards stepwise method was employed to remove non-significant variables ($P > 0{\cdot}05$) at each step until only variables reaching significance remained ($P < 0{\cdot}05$) (unadjusted model) (14,15). Omitted variables were re-entered into the models and retained as confounders if they changed the Beta estimates of any independent explanatory variable by >20% (adjusted model) (14). Collinearity, goodness of fit, significance, parsimony and variance were assessed at each step (14,15). Cases with missing data were excluded as missing data cases made up <5% in all models (14).

Results

Descriptive data for all 733 participants' outcome variables are displayed for each hospital in Table 2. Additionally, all explanatory variables and univariate analyses are summarised in Tables A1 and A2 in the Appendix. Table 2 shows that a foot-related condition was present in 86 participants [11·8% (95% CI: 9·6–14·3%)], 34 of whom had diabetes [4·6% (3·3–6·4%)]. Foot disease was present in 72 participants [9·8% (7·2–11·3%)], 33 of whom had diabetes [4·5% (3·2–6·3%)]. No differences existed between hospitals for any foot-related condition outcomes ($P > 0{\cdot}1$).

Foot disease

Foot ulcers were present in 49 participants [6·7% (5·1–8·8%)], 26 [3·6% (2·4–5·2%)] of whom had diabetes (Table 2). Foot ulcers made up 74% of the 66 participants with any type of foot wound [9·0% (7·2–11·3%)]. After univariate analysis, 15 explanatory variables were associated with foot ulcers (all, $P < 0{\cdot}05$) (Table A1). Foot infection was excluded from foot ulcer models as foot infection was only present in wounds. Table 3 shows that after adjustment for socioeconomic status, foot ulcers were independently associated with foot trauma, previous foot ulcers, moderate-critical PAD, peripheral neuropathy and past surgeon treatment in Model 1 ($P < 0{\cdot}05$). All independent variables remained significant in Model 2 ($P < 0{\cdot}01$).

Foot infections were present in 24 participants [3·3% (2·2–4·9%)], 12 [1·7% (0·9–2·9%)] of whom had diabetes (Table 2). Of participants with foot infections, 11 (46%) were mild, 7 (29%) were moderate, and 6 (25%) were severe

Table 2 Participant outcome variables for each hospital [number (%) unless otherwise stated]

	n	Total [95% CI]	Large regional (general) (*n* = 21)	Major regional (general) (*n* = 82)	Large metropolitan (general) (*n* = 90)	Major metropolitan (speciality) (*n* = 232)	Major metropolitan (general) (*n* = 308)	*P* value
Foot-related conditions	732	86 (11·8%) [9·6–14·3]	2 (9·5%)	12 (14·6%)	8 (8·9%)	19 (8·2%)	45 (14·7%)	0·147
Foot disease	732	72 (9·8%) [7·9–12·2]	1 (4·8%)	9 (11·0%)	7 (7·8%)	19 (8·2%)	36 (11·7%)	0·546
Foot ulcers	732	49 (6·7%) [5·1–8·8]	0	7 (8·5%)	4 (4·4%)	11 (4·8%)	27 (8·8%)	0·183
Foot infections	723	24 (3·3%) [2·2–4·9]	0	5 (6·2%)	3 (3·3%)	5 (2·2%)	11 (3·6%)	NA
Mild foot infection	723	11 (1·5%) [0·8–2·7]	0	2 (2·5%)	2 (2·2%)	1 (0·4%)	6 (2·0%)	NA
Moderate foot infection	723	7 (1·0%) [0·4–2·0]	0	2 (2·5%)	0	2 (0·9%)	3 (1·0%)	NA
Severe foot infection	723	6 (0·8%) [0·3–1·8]	0	1 (1·3%)	1 (1·1%)	2 (0·9%)	2 (0·7%)	NA
Ischaemia	728	33 (4·5%) [3·2–6·3]	1 (4·8%)	2 (2·4%)	3 (3·3%)	8 (3·5%)	19 (6·3%)	NA
Acute foot wounds	732	17 (2·3%) [1·4–3·7]	1 (4·8%)	4 (4·9%)	2 (2·2%)	1 (0·4%)	9 (2·9%)	NA
Amputation procedures	732	14 (1·9%) [1·1–3·2]	0	2 (2·4%)	0	2 (0·9%)	10 (3·2%)	NA
Minor amputation procedure	732	8 (1·1%) [0·5–2·2]	0	1 (1·2%)	0	1 (0·4%)	6 (1·9%)	NA
Major amputation procedure	732	6 (0·8%) [0·3–1·8]	0	1 (1·2%)	0	1 (0·4%)	4 (1·3%)	NA

95% CI, 95% confidence interval; NA, not applicable to test as the assumption of χ^2 test is violated as two cells had an expected count < 5.

Table 3 Independent associated factors for foot ulcers using multivariate logistical regression (odds ratios [95% CI])

Risk factor	Unadjusted	*P* value	Adjusted	*P* value
Model 1				
Acute foot trauma	25·35 [6·57–97·85]	<0·001	33·03 [7·29–149·67]	<0·001
Previous foot ulcer	18·84 [7·50–47·33]	<0·001	22·68 [8·27–62·15]	<0·001
Peripheral neuropathy	3·79 [1·59–9·00]	0·003	5·12 [2·01–13·05]	0·001
PAD		<0·001		<0·001
Nil PAD	Referent		Referent	
Mild PAD	0·23 [0·03–1·62]	0·141	0·27 [0·04–1·83]	0·177
Moderate PAD	11·47 [3·95–33·30]	<0·001	15·91 [4·95–51·15]	<0·001
Ischaemia (critical PAD)	3·79 [1·03–13·93]	0·045	5·02 [1·24–20·24]	0·024
Past surgeon treatment	14·79 [4·52–48·33]	<0·001	12·01 [3·28–43·92]	<0·001
Model 1 results	Pseudo R^2:0·600 omnibus: df = 7, P < 0·001	Missing: 7 (1·0%); H&L: P = 0·495	Pseudo R^2: 0·622 omnibus: df = 11, P < 0·001	Missing: 29 (4·0%); H&L: P = 0·691
Model 2				
Acute foot trauma	18·73 [4·93–71·20]	<0·001	23·29 [5·27–103·04]	<0·001
Previous foot ulcer	19·85 [8·51–46·29]	<0·001	24·39 [9·42–63·15]	<0·001
Peripheral neuropathy	4·19 [1·87–9·40]	0·001	5·73 [2·37–13·85]	<0·001
PAD		<0·001		<0·001
Nil PAD	Referent		Referent	
Mild PAD	0·35 [0·07–1·85]	0·219	0·38 [0·07–2·08]	0·262
Moderate PAD	10·71 [3·88–29·60]	<0·001	15·37 [5·03–46·91]	<0·001
Ischaemia (critical PAD)	8·36 [2·75–25·39]	<0·001	10·13 [3·03–33·84]	<0·001
Model 2 results	Pseudo R^2:0·544 omnibus df = 6, P <0·001	Missing: 7 (1·0%); H&L: P = 0·869	Pseudo R^2: 0·579 omnibus: df = 10, P < 0·001	Missing: 29 (4·0%); H&L: P = 0·890

CI, confidence interval; Pseudo R^2, Nagelkerke R^2; omnibus, omnibus tests of model coefficients; df, degrees of freedom; missing, excluded missing cases; H&L, Hosmer and Lemeshow test; PAD, peripheral arterial disease.

foot infections. After univariate analysis, 13 variables were associated with foot infection (all, $P < 0·05$) (Table A1). Foot wounds (foot ulcers and acute foot wounds) were excluded from infection models as infection was only present in wounds. Table 4 shows that after adjustment for socioeconomic status and PAD, foot infections were independently associated with previous foot ulcers, foot trauma and past surgeon treatment in Model 1 ($P < 0·01$). All independent variables remained significant in Model 2 ($P < 0·01$).

Ischaemia was present in 33 participants [4·5% (3·2–6·3%)], 12 [1·7% (0·9–2·9%)] of whom had diabetes (Table 2). After univariate analysis, 16 variables were associated with ischaemia (all, $P < 0·05$) (Table A1). No confounders were identified. Table 5 shows ischaemia was independently associated with older age, current smoking and past surgeon treatment in Model 1 ($P < 0·01$); however, no independent variables remained significant in Model 2 ($P > 0·05$).

Acute foot wounds

Acute foot wounds were present in 17 participants [2·3% (1·4–3·7%)], one [0·1% (0–0·9%)] of whom had diabetes

Table 4 Independent associated factors for foot infections using multivariate logistical regression (odds ratios [95% CI])

Risk factor	Unadjusted	*P* value	Adjusted	*P* value
Model 1				
Acute foot trauma	16·67 [3·73–74·43]	<0·001	19·16 [2·82–130·12]	0·003
Previous foot ulcer	23·01 [7·97–66·44]	<0·001	39·81 [10·94–144·90]	<0·001
Past surgeon treatment	8·68 [2·71–27·83]	<0·001	19·88 [3·56–110·98]	0·001
Model 1 results	Pseudo R^2:0·452 omnibus: df = 3, $P < 0·001$	Missing: 12 (1·6%); H&L: $P = 1·00$	Pseudo R^2: 0·536 omnibus: df =10, $P < 0·001$	Missing: 37 (5·0%); H&L: $P = 0·904$
Model 2				
Acute foot trauma	13·65 [3·24–57·45]	<0·001	No confounders identified	
Previous foot ulcer	35·95 [13·11–98·56]	<0·001		
Model 2 results	Pseudo R^2:0·391 omnibus: df =2, $P < 0·001$	Missing: 12 (1·6%); H&L: $P = 1·00$		

Pseudo R^2, Nagelkerke R^2; omnibus, omnibus tests of model coefficients; df, degrees of freedom; missing, excluded missing cases; H&L, Hosmer and Lemeshow test.

Table 5 Independent associated factors for ischaemia using multivariate logistical regression (odds ratios [95% CI])

Risk factor	Unadjusted	*P* value	Adjusted	*P* value
Model 1				
Age (continuous year)	1·06 [1·03–1·09]	<0·001	No confounders identified	
Smoker	4·92 [1·71–14·17]	0·003		
Past surgeon treatment	21·02 [8·51–51·91]	<0·001		
Model 1 results:	Pseudo R^2:0·235 omnibus: df = 3, $P < 0·001$	Missing: 7 (1·0%); H&L: $P = 0·141$		
Model 2				
Nil	All	>0·05	All	>0·05
Model 1 results				

Pseudo R^2, Nagelkerke R^2; omnibus, omnibus tests of model coefficients; df, degrees of freedom; missing, excluded missing cases; H&L, Hosmer and Lemeshow test.

(Table 2). Acute foot wounds made up 26% of the 66 participants with any type of foot wound. After univariate analysis, five variables were associated with acute foot wounds (all, $P < 0·05$) (Table A2). Foot trauma was excluded from acute foot wound models as all participants with acute foot wounds had acute foot trauma. Table 6 shows that acute foot wounds were not independently associated with any variables in Model 1 ($P > 0·05$). However, in Model 2 after adjustment for inside footwear worn and foot deformity, acute foot wounds were independently associated with younger age (<40 years) ($P < 0·05$).

Amputation procedures

Amputation procedures were present in 14 participants [1·9% (1·1–3·2%)], 10 [1·4% (0·7–2·5%)] of whom had diabetes (Table 2). Of those 14, eight (57%) were minor, and six (43%) were major amputations. Minor and major amputation procedures were combined for regression because of the limited number of amputation procedures. The reason for the amputation procedure was foot disease in 12 participants and foot trauma and multi-organ failure in one participant each. After univariate analysis, 17 variables were associated with having an amputation procedure (all, $P < 0·05$) (Table A2). Foot ulcers and acute foot wounds were excluded as collinearity was identified with foot infection and foot trauma, respectively. Table 7 shows amputations were not independently associated with any variables in Model 1 ($P > 0·05$). However, in Model 2, after adjustment for previous foot ulcers, amputations were independently associated with foot infection in Model 2 ($P < 0·01$).

Discussion

Our study is the first to investigate the overall inpatient burden of foot-related conditions within a representative inpatient population. Our findings indicate that 11·8% of all inpatients had a major foot-related condition present. Foot disease was present in 9·8% of participants (6·7% ulcers, 3·3% infections and 4·5% ischaemia); 2·3% had acute foot wounds and 1·9% new amputation procedures. Interestingly, 46% of participants with foot disease had diabetes, whereas 70% of those undergoing an amputation procedure had diabetes. Foot ulcers and infections were more likely in inpatients with a previous foot ulcer, trauma, PAD, peripheral neuropathy or those who had past foot treatment by a surgeon. Ischaemia was more likely to be found in inpatients of older age, smokers or those who had past surgeon treatment. Amputation procedures were more likely in those with a foot infection, whereas acute foot wounds

Table 6 Independent associated factors for acute foot wounds using multivariate logistical regression (odds ratios [95% CI])

Risk factor	Unadjusted	*P* value	Adjusted	*P* value
Model 1				
Nil	All	>0·05	All	>0·05
Model 1 results:				
Model 2				
Age groups		0·002		0·006
18–40 years	Referent		Referent	
41–60 years	0·25 [0·07–0·82]	0·023	0·24 [0·07–0·82]	0·023
61–80 years	0·11 [0·03–0·41]	0·001	0·07 [0·01–0·38]	0·002
81+ years	0·10 [0·01–0·78]	0·028	0·11 [0·01–1·04]	0·054
Model 2 results	Pseudo R^2:0·103 omnibus: df = 3, P = 0·002	Missing: 4 (0·5%); H&L, P = 1·00	Pseudo R^2: 0·166 omnibus: df = 7, P = 0·002	Missing: 30 (4·1%); H&L: P = 0·642

Pseudo R^2, Nagelkerke R^2; omnibus, omnibus tests of model coefficients; df, degrees of freedom; missing, excluded missing cases; H&L, Hosmer and Lemeshow test.

Table 7 Independent associated factors for amputation procedures using multivariate logistical regression (odds ratios [95% CI])

Risk factor	Unadjusted	*P* value	Adjusted	*P* value
Model 1				
Nil	All	>0·05	All	>0·05
Model 1 results				
Model 2				
Infection	77·22 [17·88–333·43]	<0·001	18·14 [2·97–110·76]	0·002
Model 2 results	Pseudo R^2:0·336 omnibus: df =1, P < 0·001	Missing: 11 (1·5%); H&L: P = 1·00	Pseudo R^2: 0·390 omnibus: df = 2, P < 0·001	Missing: 12 (1·6%); H&L: P = 1·00

Pseudo R^2, Nagelkerke R^2, omnibus, omnibus tests of model coefficients; df, degrees of freedom; missing, excluded missing cases; H&L, Hosmer and Lemeshow test.

were more likely in younger inpatients. These findings suggest that the overall foot-related inpatient burden is considerably larger than historically appreciated and is mostly made up of foot disease.

Although this is the first study of its kind, our prevalence findings are generally consistent with the limited available previous reports on specific or subgroups of foot disease disorders from a recent systematic review (6). First, our 9·8% foot disease finding fell within the review's crude heterogeneous range (0·2–11·9%), as did our 6·7% foot ulcer (0·3–13·5%) and 3·3% foot infection finding (0·1–6·4%) (6). Our 4·5% ischaemia finding was much lower than the 7·2% from the only previous similar study (16). However, this may be explained by the previous study investigating only people over 40 years using ankle brachial indices and medical record audits, which have a higher false positive rate than the toe systolic pressures used by our study (16). Second, our 4·5% diabetes-related foot disease finding was remarkably consistent with the 4·7% pooled prevalence estimate from the review (6). Also, our 1·4% diabetes-related amputation procedure prevalence was very similar to the 1·5% reported from the review (6). While our 3·5% diabetes-related foot ulcer prevalence was higher than the 2·4% pooled prevalence estimate (6), our 1·7% diabetes-related foot infections was lower than the 3·4% pooled estimate (6). Lastly, consistent with diabetes-related foot infection studies, all foot infections in our study were present within foot wounds, regardless of diabetes (6,11). Additionally, our infection severity findings were similar to the largest prospective diabetes-related foot infection study (11); 46% for mild (versus 47% in a previous study), 29% moderate (versus 34%) and 25% severe infections (versus 18%) (11).

This general consistency with available findings from the literature reassures us of the reliability and validity of our overall findings. In our previous study, we found that 4·9% of all inpatients were in hospital for the primary reason of foot disease (4). The 9·8% findings from this study, in combination with the findings of the previous study (4), suggests that one in every 10 representative inpatients (9·8%) has foot disease present, and half (4·9%) of those are in hospital because of their foot disease (4). Interestingly, the equivalent diabetes-related foot disease findings from these studies suggest that one in every 22 representative inpatients (4·5%) has diabetes-related foot disease present, and nearly half (2·0%) of those are in hospital because of their foot disease (4). Alternatively, in the 23·5% of inpatients with diabetes, this suggests that one in every five diabetes inpatients (19·2%) has foot disease present, and nearly one in 10 diabetes inpatients (8·7%) are in hospital because of their foot disease (4).

When interpreted against other Australian inpatient literature, our previous findings indicated that foot disease was a top 10 direct cause of hospitalisation in Australia (4). The valid and reliable self-reported medical history findings of this study now allows for a more direct comparison of the size of the overall burden of foot disease to other medical conditions

in a representative sample of inpatients. This study identified that similar proportions of inpatients had a self-reported foot ulcer (disease) history (10%) to those reporting a chronic kidney disease history (12%) or cerebrovascular disease history (12%). This suggests that the overall inpatient burden imposed by foot disease is comparable in size to those imposed by the more well-known and resourced conditions of kidney and cerebrovascular disease. Furthermore, it is highly likely that our study under-reported those with a foot disease history as some patients with previous amputations did not also have previous foot ulcers, and we did not capture those with previous foot infections or previous ischaemia. Considering that our previous study reported foot disease to be a leading cause of hospitalisation in Australia when compared to other inpatient disease in similar inpatient literature (4,17), this paper reinforces the need for policy makers, clinicians and researchers to address the overall inpatient burden of foot disease in the same way they already do for other leading causes of the overall inpatient burden (4). This recommendation is further reinforced when considering that the population we investigated has been reported to have very similar demographic, diabetes and medical history characteristics to those reported in other large Australian and international inpatient studies (4).

This is one of the first studies to investigate associations with foot-related conditions (6,7,18). Interestingly, although we adjusted for diabetes, our findings are consistent with studies reporting factors associated with diabetes-related foot disease (19,20). First, studies investigating diabetes-related foot ulcers consistently identify the common risk factors of peripheral neuropathy, PAD, previous foot ulcers and trauma (19,20). After controlling for diabetes, these factors were also independently associated with foot ulcers in our study. Second, consistently reported risk factors for diabetes-related foot infection are foot ulcers, previous foot ulcers and trauma, and again after controlling for diabetes, these were the factors identified in our study (10,11). Third, we identified older age and smoking to be independently associated with inpatient ischaemia, which was consistent with the only previous similar inpatient study of ischaemia (16). Fourth, while acute foot wounds in inpatients had yet to be studied, the independent factor of younger age identified in our study is consistent with trauma-related amputation literature (12,13). Lastly, nearly all amputation procedures were performed in patients with active foot disease, which is consistent with most amputation literature (7,11–13). However, interestingly, 70% of these amputation procedures were on inpatients with diabetes-related foot disease, yet people with diabetes only represented 46% of the inpatients with foot disease. This finding suggests that diabetes inpatients with foot disease have worse hospitalisation outcomes than non-diabetes inpatients with foot disease. It could be hypothesised that this was because inpatients with diabetes present with an increased severity of foot disease, which was not reflected in the limited severity measures reported in our study (such as ischaemia or infection severity), or perhaps inpatients with foot disease are treated differently if they have diabetes compared to if they do not have diabetes while they are in hospital.

In addition to exploring the demographic, social determinant, comorbidity and foot disease history factors typically investigated in similar diabetes-related foot disease studies, our study also explored associations with previous foot treatment, footwear and self-care ability. Past foot treatment by a surgeon in the year prior to hospitalisation was the only factor identified from these modifiable variables to be independently associated with foot disease disorders. This is not surprising considering surgeons are a key member of recommended outpatient multidisciplinary foot disease teams (21–23). Perhaps more surprising was that no other footwear, self-care or past foot treatment factor was also associated with inpatient foot disease disorders. In particular, there was no association found in our study with any of the other recommended outpatient multidisciplinary foot disease team members (medical, podiatry, nursing and orthotist (21–26)). It may be hypothesised that inpatients with foot disease were more likely to be in hospital because they had not been attended by such a multidisciplinary foot disease team prior to hospitalisation (4,21–26). This hypothesis is reinforced when considering that Australian regions implementing access to outpatient multidisciplinary foot disease teams have demonstrated significant reductions in hospitalisation and amputation rates in diabetes populations (22,27). Regardless, as per previous recommendations, hospitalisation is seen as an ideal opportunity to triage inpatients with foot disease into the recommended care of multidisciplinary foot disease teams to reduce future inpatient burdens from re-admission and amputation (4,22,24–26).

The findings of this study also have other potentially significant future policy, clinical and research implications. First, our findings suggest that an average hospital with 600 beds could expect to house at any given time 71 inpatients with a major foot-related condition present, including 59 with foot disease and 11 recovering from an amputation procedure. Forecasting this across Australia's 49 153 available overnight public hospital beds (18) suggests that 4817 public hospital beds each night host a patient with foot disease, including 934 with a patient recovering from an amputation procedure. With the cost of an Australian hospital bed on average being AU$971 (28), it can be extrapolated that each year foot disease contributes to an overall cost burden of AU$4·7 billion (directly and indirectly) on the Australian public hospital system. Second, with such a comparatively large inpatient burden of foot disease, policy makers should consider implementing similar inpatient continuum of care strategies that are commonly used for other large inpatient burdens, such as chronic kidney disease and cerebrovascular disease. Furthermore, strong consideration should be given to expanding coverage of multidisciplinary diabetic foot disease teams to all inpatients with foot disease regardless of diabetes. Third, with a self-reported previous foot ulcer history being found to be independently associated with foot disease, simply questioning all inpatients on admission to hospital may be a very effective and efficient recommendation to identify the vast majority of inpatients with foot disease. Last, further research is recommended to investigate both the predictors and successful interventions for the very large inpatient population with foot disease, particularly those with non-diabetic foot disease.

This study should be read cognisant of several strengths and limitations as previously reported (4). In brief, strengths included using existing literature to adequately power the study (4,6); investigating an inpatient population that was highly representative of reported Australian inpatient

populations (4,17,29) and comparable to international inpatient populations, particularly for diabetes prevalence (4,29–31); employing trained and tested data collectors (4,8) who used a valid and reliable data collection instrument (4,8); and analysing data using recommended regression models, adjusting for a range of confounders (14,15). Limitations included using a cross-sectional study design that can only report associated factors; excluding older, cognitively impaired patients reported to have higher foot disease prevalence; only investigating for full-thickness wounds, which under-reports stage 1 pressure injuries (6); and using self-reported past foot treatment variables. Additionally, amputation procedures were aggregated, and this may have affected our regression findings as minor and major amputation procedures are generally performed for different clinical reasons (7,12,13). Finally, it is acknowledged that performing a large number of statistical comparisons and using regression on outcomes with less than 20 cases does increase the likelihood of a type 1 statistical error (14,15).

In conclusion, our methodologically robust point prevalence study is the first to report the overall foot-related inpatient burden. Our study identified that foot-related conditions, particularly foot disease, caused an overall inpatient burden that is comparable to other well-known inpatient burdens, such as those caused by chronic kidney disease and cerebrovascular disease. Furthermore, although our study adjusted for diabetes, we still found similar independent factors associated with foot disease that had been previously found for diabetes-related foot disease. It is recommended that policy makers, clinicians and researchers seriously consider adopting inpatient strategies that have been used with success in other large comparable well-known diseases so as to reduce this large, yet seemingly silent, overall inpatient burden caused by foot disease.

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Appendix

Table A1 Univariate analysis for participants with a foot ulcer, foot infection or ischaemia

Variables	All	Foot ulcer			Foot infection			Ischaemia		
		n (%)	Odds ratio [95% CI]	*P* value	*n* (%)	Odds ratio [95% CI]	*P* value	*n* (%)	Odds ratio [95% CI]	*P* value
Participants*	733	49 (6·7%)	[5·1–8·7%]		24 (3·3%)	[2·2–4·9%]		33 (4·5%)	[3·2–6·3%]	
Medical ward	459 (62·6%)	26 (53·1%)	1·00		13 (54·2%)	1·00		16 (48·5%)	1·00	
Surgical ward	274 (37·4%)	23 (46·9%)	1·53 [0·85–2·74]	0·153*†	11 (45·8%)	1·46 [0·65–3·32]	0·361†	17 (51·5%)	1·83 [0·91–3·69]	0·090*†
Demographics										
Age (SD) years	62·0 (18·6)	66·0 (15·7)	1·01 [0·99–1·03]	0·128*	61·1 (18·8)	1·00 [0·98–1·02]	0·799	71·1 (13·4)	1·03 [1·01–1·06]	0·005**
Age groups				0·124*			0·450			0·069*
18–40 years	110 (15·0%)	4 (8·2%)	1·00		3 (12·5%)	1·00		1 (3·0%)	1·00	
41–60 years	188 (25·7%)	11 (22·4%)	1·67 [0·52–5·36]	0·392	7 (29·2%)	1·36 [0·34–5·36]	0·664	5 (15·2%)	3·01 [0·35–26·11]	
61–80 years	316 (43·2%)	29 (59·2%)	2·68 [0·92–7·80]	0·071	13 (54·2%)	1·51 [0·42–5·41]	0·535	18 (54·5%)	6·65 [0·88–50·42]	0·067
81+ years	117 (16·0%)	5 (10·2%)	1·18 [0·31–4·52]	0·806	1 (4·2%)	0·30 [0·03–2·92]	0·299	9 (27·3%)	9·08 [1·13–72·93]	0·038
Male gender	408 (55·8)	28 (57·1%)	1·06 [0·59–1·90]	0·848	16 (66·7%)	1·61 [0·68–3·82]	0·278	20 (60·6%)	1·22 [0·60–2·50]	0·580
Social determinants										
Socioeconomic status	711			0·328			0·586			0·181*
Most disadvantaged	102 (14·3%)	10 (22·2%)	1·00		3 (14·3%)	1·00		8 (25·8%)	1·00	
Second most disadvantaged	159 (22·4%)	12 (26·7%)	0·74 [0·31–1·79]	0·507	7 (33·3%)	1·52 [0·38–6·02]	0·552	6 (19·4%)	0·46 [0·15–1·36]	0·159
Middle	98 (13·8%)	4 (8·9%)	0·39 [0·12–1·28]	0·120	1 (4·8%)	0·34 [0·03–3·30]	0·350	3 (9·7%)	0·36 [0·09–1·41]	0·144
Second least disadvantaged	240 (33·8%)	15 (33·3%)	0·61 [0·26–1·41]	0·246	8 (38·1%)	1·13 [0·29–4·33]	0·864	13 (41·9%)	0·66 [0·27–1·65]	0·375
Least disadvantaged	112 (15·8%)	4 (8·9%)	0·34 [0·10–1·11]	0·074	2 (9·5%)	0·60 [0·10–3·66]	0·579	1 (3·2%)	0·10 [0·01–0·84]	0·034
Geographic remoteness	711			0·907			0·807			0·345
Major city	435 (61·2%)	26 (57·8%)	1·00		13 (61·9%)	1·00		17 (54·8%)	1·00	
Inner regional area	153 (21·5%)	9 (20·0%)	0·99 [0·62–3·97]	0·975	4 (19·0%)	0·90 [0·29–2·81]	0·858	5 (16·1%)	0·84 [0·30–2·31]	0·729
Outer regional area	66 (9·3%)	6 (13·3%)	1·57 [0·62–3·97]	0·341	2 (9·5%)	1·02 [0·27–4·64]	0·976	6 (19·4%)	2·44 [0·93–6·44]	0·071
Remote area	30 (4·2%)	2 (4·4%)	1·12 [0·25–4·97]	0·881	0	0	NA	1 (3·2%)	0·84 [0·11–6·55]	0·869
Very remote area	27 (3·8%)	2 (4·4%)	1·26 [0·28–5·59]	0·765	2 (9·5%)	2·58 [0·55–12·06]	0·229	2 (6·5%)	1·95 [0·43–8·93]	0·388
<Year 10 education level	395 (54·0%)	32 (65·3%)	1·65 [0·91–3·04]	0·105*	14 (58·3%)	1·21 [0·53–2·76]	0·652	25 (75·8%)	2·79 [1·24–6·28]	0·013**
Indigenous	34 (4·6%)	3 (6·1%)	1·37 [0·40–4·64]	0·616	2 (8·3%)	1·89 [0·43–8·40]	0·402	2 (6·1%)	1·34 [0·31–5·82]	0·701
Born overseas	161 (22·0%)	5 (10·2%)	0·38 [0·15–0·98]	0·045**	2 (8·3%)	0·31 [0·07–1·32]	0·113*	4 (12·1%)	0·47 [0·16–1·36]	0·164*
Medical condition history										
Diabetes	172 (23·5%)	26 (53·1%)	4·15 [2·30–7·49]	<0·001**	12 (50·0%)	3·45 [1·52–7·84]	0·003**	12 (36·4%)	1·93 [0·93–4·00]	0·079*
Hypertension	359 (49·0%)	29 (59·2%)	1·56 [0·86–2·80]	0·141*	12 (50·0%)	1·04 [0·46–2·34]	0·929	22 (66·7%)	2·15 [1·03–4·50]	0·042**
Dyslipidaemia	234 (31·9%)	17 (34·7%)	1·15 [0·62–2·11]	0·661	6 (25·0%)	0·71 [0·28–1·81]	0·468	17 (51·5%)	2·37 [1·18–4·78]	0·016**
Myocardial infarction	146 (19·9%)	9 (18·4%)	0·90 [0·42–1·89]	0·771	4 (16·7%)	0·79 [0·27–2·35]	0·674	12 (36·4%)	2·42 [1·16–5·03]	0·019*
Cerebrovascular accident	85 (11·6%)	6 (12·2%)	10·7 [0·44–2·58]	0·889	4 (16·7%)	1·55 [0·52–4·64]	0·436	7 (21·2%)	2·13 [0·90–5·07]	0·088*
Chronic kidney disease	89 (12·1%)	10 (20·4%)	1·96 [0·94–4·07]	0·073*	3 (12·5%)	1·03 [0·31–3·53]	0·960	7 (21·2%)	2·04 [0·86–4·85]	0·106*
Cancer	174 (23·7%)	15 (30·6%)	1·45 [0·77–2·73]	0·249	7 (29·2%)	1·31 [0·54–3·22]	0·553	6 (18·2%)	0·71 [0·29–1·75]	0·453
Arthritis	274 (37·4%)	23 (46·9%)	1·55 [0·86–2·75]	0·147*	12 (50·0%)	1·68 [0·74–3·79]	0·213	17 (51·5%)	1·85 [0·92–3·72]	0·086*
Depression	191 (26·1%)	11 (22·4%)	0·81 [0·40–1·61]	0·545	6 (25·0%)	0·94 [0·37–2·40]	0·897	8 (24·2%)	0·91 [0·40–2·05]	0·818
Acute foot trauma	26 (3·5%)	10 (20·4%)	10·67 [4·55–25·06]	<0·001**	6 (25·0%)	16·31 [5·62–47·30]	<0·001**	1 (3·0%)	0·84 [0·11–6·38]	0·864
Smoker	104 (14·2%)	7 (14·3%)	1·02 [0·44–2·33]	0·968	7 (29·2%)	2·65 [1·07–6·56]	0·035**	8 (24·2%)	2·02 [0·89–4·61]	0·095*

Table A1 Continued

Variables	All	Foot ulcer			Foot infection			Ischaemia		
		n (%)	Odds ratio [95% CI]	*P* value	*n* (%)	Odds ratio [95% CI]	*P* value	*n* (%)	Odds ratio [95% CI]	*P* value
Ex-smoker	304 (41·5%)	19 (38·8%)	0·89 [0·49–1·61]	0·694	10 (41·7%)	1·00 [0·44–2·29]	0·997	12 (36·4%)	0·800 [0·39–1·65]	0·542
Self-care ability										
Mobility impairment	242 (33·2%)	29 (59·2%)	3·17 [1·75–5·74]	<0·001**	11 (45·8%)	1·77 [0·78–4·00]	0·173*	17 (51·5%)	2·25 [1·12–4·54]	0·023**
Vision impairment	110 (15·1%)	10 (20·4%)	1·49 [0·72–3·08]	0·284	6 (25·0%)	1·92 [0·74–4·95]	0·177*	12 (36·4%)	3·51 [1·67–7·37]	0·001**
Footwear worn: inside				0·655			0·202			0·470
Low-risk footwear	81 (11·1%)	6 (12·5%)	1·00		4 (16·7%)	1·00		2 (6·1%)	1·00	
Moderate-risk footwear	263 (36·1%)	20 (41·7%)	1·03 [0·40–2·66]	0·953	6 (25·0%)	0·45 [0·12–1·63]	0·224	16 (48·5%)	2·56 [0·58–11·37]	0·217
High-risk footwear	139 (19·1%)	6 (12·5%)	0·57 [0·18–1·82]	0·342	2 (8·3%)	0·28 [0·05–1·57]	0·149	5 (15·2%)	1·50 [0·28–7·90]	0·635
No footwear worn	245 (33·7%)	16 (33·3%)	0·87 [0·33–2·31]	0·785	12 (50·0%)	0·99 [0·31–3·17]	0·988	10 (30·3%)	1·68 [0·36–7·84]	0·509
Footwear worn: outside				0·885			0·888			0·224
Low-risk footwear	386 (53·2%)	23 (47·9%)	1·00		12 (50·0%)	1·00		15 (45·5%)	1·00	
Moderate-risk footwear	75 (10·3%)	6 (12·5%)	1·37 [0·54–3·49]	0·507	3 (12·5%)	1·27 [0·35–4·63]	0·713	7 (21·2%)	2·55 [1·00–6·48]	0·050
High-risk footwear	250 (34·4%)	18 (37·5%)	1·23 [0·65–2·33]	0·525	8 (33·3%)	1·02 [0·41–2·53]	0·967	10 (30·3%)	10·4 [0·46–2·35]	0·926
No footwear worn	15 (2·1%)	1 (2·1%)	1·13 [0·14–8·95]	0·910	1 (4·2%)	2·19 [0·27–17·99]	0·468	1 (3·0%)	1·77 [0·22–14·33]	0·594
Past foot treatment										
Yes	256 (34·9%)	39 (79·6%)	8·36 [4·10–17·05]	<0·001**	19 (79·2%)	7·65 [2·82–20·74]	<0·001**	24 (72·7%)	5·39 [2·47–11·79]	<0·001**
Podiatry	180 (24·6%)	25 (51·0%)	3·54 [1·97–6·38]	<0·001**	11 (45·8%)	2·72 [1·20–6·18]	0·017**	17 (51·5%)	3·50 [1·73–7·08]	0·001**
GP	93 (12·7%)	26 (53·1%)	10·38 [5·61–19·20]	<0·001**	16 (66·7%)	16·64 [6·89–40·19]	<0·001**	9 (27·3%)	2·77 [1·24–6·15]	0·013**
Surgeon	36 (4·9%)	19 (38·8%)	24·78 [11·71–52·43]	<0·001**	10 (41·7%)	20·09 [8·10–49·80]	<0·001**	12 (36·4%)	16·70 [7·34–37·99]	<0·001**
Physician	21 (2·9%)	6 (12·2%)	6·21 [2·29–16·79]	<0·001**	2 (8·3%)	3·44 [0·75–15·75]	0·112*	2 (6·1%)	2·30 [0·51–10·30]	0·278
Nurse	20 (2·7%)	12 (24·5%)	27·32 [10·53–70·93]	<0·001**	6 (25·0%)	17·59 [6·01–51·52]	<0·001**	5 (15·2%)	8·10 [2·75–23·85]	<0·001**
Orthotist	4 (0·5%)	2 (4·1%)	14·47 [1·99–105·01]	0·008	2 (8·3%)	31·68 [4·27–235·36]	0·001	1 (3·0%)	7·21 [0·73–71·24]	0·091*
Other	9 (1·2%)	0	0	NA	0	0	NA	0	0	NA
Foot disease history										
Previous foot ulcer	72 (9·8%)	33 (67·3%)	33·95 [17·22–66·95]	<0·001**	18 (75·0%)	38·00 [14·45–99·93]	<0·001**	16 (48·5%)	10·94 [5·24–22·83]	<0·001**†
Previous amputation	30 (4·1%)	14 (29·2%)	17·14 [7·73–37·98]	<0·001**	7 (29·2%)	13·25 [4·97–35·37]	<0·001**	9 (27·3%)	12·64 [5·21–30·65]	<0·001**†
Foot risk factors										
Peripheral neuropathy	160 (22·0%)	30 (62·5%)	7·05 [3·81–13·04]	<0·001**	15 (62·5%)	6·55 [2·81–15·27]	<0·001**	14 (42·4%)	2·79 [1·37–5·70]	0·005**
PAD				<0·001**			<0·001**			
Nil PAD	575 (79·0%)	18 (37·5%)	1·00		12 (50·0%)	1·00		–	–	–
Mild PAD	69 (9·5%)	2 (4·2%)	0·92 [0·21–4·07]	0·916	0	0	NA	–	–	–
Moderate PAD	51 (7·0%)	15 (31·3%)	12·89 [6·00–27·67]	<0·001**	8 (33·3%)	8·84 [3·43–22·82]	<0·001**	–	–	–
Ischaemic (Critical PAD)	33 (4·5%)	13 (27·1%)	20·11 [8·67–46·65]	<0·001**	4 (16·7%)	6·88 [2·08–22·73]	0·002**	–	–	–
Foot deformity	158 (22·4%)	19 (41·3%)	2·64 [1·43–4·88]	0·002**	8 (34·8%)	1·92 [0·80–4·61]	0·146*	11 (36·7%)	2·10 [0·98–4·51]	0·058*†
Foot disease disorders										
Foot ulcer	49 (6·7%)	–	–	–	21 (87·5%)	196·29 [54·8–703·5]	<0·001**	13 (39·4%)	12·26 [5·64–26·65]	<0·001**†
Acute foot wound	17 (2·3%)	–	–	–	3 (12·5%)	12·30 [3·05–49·70]	<0·001**	0	0	NA
Foot infection	24 (3·3%)	21 (46·7%)	196·29 [54·8–703·5]	<0·001**†	–	–	–	4 (12·9%)	4·95 [1·58–15·48]	0·006**†

GP, general practitioner; PAD, peripheral arterial disease; SD, standard deviation.

*95% CI are for prevalence figures.

†Explanatory variable excluded from multivariate model as considered not on causal pathway for outcome.

*$P < 0·2$; **$P < 0·05$.

Table A2 Univariate analysis for participants with an acute foot wound or new amputation procedure

		Acute foot wound			Amputation procedure		
Variables	All	*n* (%)	Odds ratio [95% CI]	*P* value	*n* (%)	Odds ratio [95% CI]	*P* value
Participants*	733	17 (2·3%)	[1·4–3·7%]		14 (1·9%)	[1·1–3·2%]	
Medical ward	459 (62·6%)	6 (35·9%)	1·00		5 (35·7%)	1·00	
Surgical ward	274 (37·4%)	11 (64·7%)	3·61 [1·16–8·65]	0·025**†	9 (64·3%)	3·08 [1·02–9·28]	0·046*†
Demographics							
Age (SD) years	62·0(18·6)	42·4(19·4)	0·95 [0·93–0·97]	<0·001**	65·5(12·7)	1·01 [0·98–1·04]	0·481
Age groups				0·002**			0·702
18–40 years	110 (15·0%)	9 (52·9%)	1·00		0	1·00	
41–60 years	188 (25·7%)	4 (23·5%)	0·24 [0·07–0·82]	0·023	4 (28·6%)	0	NA
61–80 years	316 (43·2%)	3 (17·6%)	0·11 [0·03–0·41]	0·001	9 (64·3%)	0	NA
81+ years	117 (16·0%)	1 (5·9%)	0·10 [0·01–0·78]	0·028	1 (7·1%)	0	NA
Male sex	408 (55·8)	13 (76·5%)	2·62 [0·85–8·12]	0·094*	9 (64·3%)	1·44 [0·48–4·33]	0·519
Social determinants							
Socioeconomic Status	711			0·657			0·983
Most disadvantaged	102 (14·3%)	1 (5·9%)	1·00		3 (21·4%)	1·00	
Second most disadvantaged	159 (22·4%)	5 (29·4%)	3·25 [0·37–28·20]	0·286	4 (28·6%)	0·85 [0·19–3·87]	0·836
Middle	98 (13·8%)	3(17·6%)	3·16 [0·32–30·89]	0·323	0	0	NA
Second least disadvantaged	240 (33·8%)	4 (1·7%)	1·70 [0·19–15·42]	0·636	5 (35·7%)	0·71 [0·17–3·01]	0·637
Least disadvantaged	112 (15·8%)	4 (1·7%)	3·70 [0·41–33·70]	0·245	2 (14·3%)	0·60 [0·10–3·67]	0·580
Geographic remoteness	711			0·741			0·942
Major city	435 (61·2%)	9 (52·9%)	1·00		8 (57·1%)	1·00	
Inner regional area	153 (21·5%)	6 (35·3%)	1·94 [0·68–5·55]	0·216	4 (28·6%)	1·43 [0·42–4·82]	0·564
Outer regional area	66 (9·3%)	1 (5·9%)	0·73 [0·09–5·83]	0·764	1 (7·1%)	0·82 [0·10–6·66]	0·852
Remote area	30 (4·2%)	0	0	NA	0	0	NA
Very remote area	27 (3·8%)	1 (5·9%)	1·82 [0·22–14·89]	0·578	1 (7·1%)	2·05 [0·25–17·00]	0·507
<Year 10 education level	395 (54·0%)	8 (47·1%)	0·75 [0·29–1·97]	0·560	11 (78·6%)	3·17 [0·88–11·46]	0·078*
Indigenous	34 (4·6%)	1 (5·9%)	1·29 [0·17–10·00]	0·809	1 (7·1%)	1·59 [0·20–12·56]	0·658
Born overseas	161 (22·0%)	2 (11·8%)	[0·11–2·05]	0·311	2 (14·3%)	0·58 [0·13–2·64]	0·484
Medical condition history							
Diabetes	172 (23·5%)	1 (5·9%)	0·20 [0·03–1·51]	0·118*	10 (71·4%)	8·58 [2·66–27·72]	<0·001**
Hypertension	359 (49·0%)	4 (23·5%)	0·31 [0·10–0·97]	0·044**	8 (57·1%)	1·40 [0·48–4·08]	0·535
Dyslipidaemia	234 (31·9%)	2 (11·8%)	0·28 [0·06–1·23]	0·092*	7 (50·5%)	2·16 [0·75–6·24]	0·153*
Myocardial Infarct	146 (19·9%)	0	0	NA	4 (28·6%)	1·62 [0·50–5·25]	0·419
Cerebrovascular accident	85 (11·6%)	1 (5·9%)	0·47 [0·06–3·58]	0·465	3 (21·4%)	2·12 [0·58–7·74]	0·258
Chronic kidney disease	89 (12·1%)	0	0	NA	4 (28·6%)	2·98 [0·91–9·71]	0·070*
Cancer	174 (23·7%)	0	0	NA	4 (28·6%)	1·29 [0·40–4·14]	0·671
Arthritis	274 (37·4%)	3 (17·6%)	0·35 [0·10–1·25]	0·106*	4 (28·6%)	0·67 [0·21–2·15]	0·498
Depression	191 (26·1%)	8 (47·1%)	2·58 [0·98–6·78]	0·055*	2 (14·3%)	0·47 [0·10–2·10]	0·321
Acute foot trauma	26 (3·5%)	14 (82·4%)	273·0 [69·28–1075·75]	<0·001	4 (28·6%)	12·66 [3·68–43·50]	<0·001**
Smoker	104 (14·2%)	4 (23·5%)	1·91 [0·61–5·98]	0·266	3 (21·4%)	1·67 [0·46–6·08]	0·439
Ex-smoker	304 (41·5%)	7 (41·2%)	0·99 [0·37–2·63]	0·982	6 (42·9%)	1·06 [0·37–3·10]	0·911
Self-care ability							
Mobility impairment	242 (33·2%)	4 (23·5%)	0·61 [0·20–1·90]	0·394	10 (71·4%)	5·21 [1·62–16·77]	0·006**
Vision impairment	110 (15·1%)	0	0	NA	3 (21·4%)	1·55 [0·43–5·66]	0·505
Footwear worn: inside				0·152*			0·589
Low-risk footwear	81 (11·1%)	2 (12·5%)	1·00		2 (16·7%)	1·00	
Moderate-risk footwear	263 (36·1%)	1 (6·3%)	0·15 [0·01–1·69]	0·124	6 (50·0%)	0·92 [0·18–4·66]	0·922
High-risk footwear	139 (19·1%)	6 (37·5%)	1·18 [0·35–9·11]	0·480	2 (16·7%)	0·58 [0·08–4·17]	0·586
No footwear worn	245 (33·7%)	7 (43·8%)	1·16 [0·24–5·71]	0·854	2(16·7%)	0·33 [0·05–2·35]	0·265
Footwear worn: outside				0·957			0·613
Low-risk footwear	386 (53·2%)	9 (56·3%)	1·00		8 (66·7%)	1·00	
Moderate-risk footwear	75 (10·3%)	1 (6·3%)	0·57 [0·07–4·54]	0·592	2 (16·7%)	1·30 [0·27–6·22]	0·747
High-risk footwear	250 (34·4%)	6 (37·5%)	1·03 [0·36–2·94]	0·950	2 (16·7%)	0·38 [0·08–1·81]	0·225
No footwear worn	15 (2·1%)	0	0	NA	0	0	NA
Past foot treatment							
Yes	256 (34·9%)	3 (17·6%)	0·39 [0·11–1·37]	0·142*	13 (92·9%)	25·41 [3·31–195·39]	0·002**
Podiatry	180 (24·6%)	1 (5·9%)	0·19 [0·03–1·42]	0·105*	9 (64·3%)	5·76 [1·90–17·41]	0·002**
GP	93 (12·7%)	1 (5·9%)	0·42 [0·06–3·22]	0·406	11 (78·6%)	28·44 [7·77–104·05]	<0·001**
Surgeon	36 (4·9%)	1 (5·9%)	1·21 [0·16–9·41]	0·854	9 (64·3%)	46·07 [14·46–146·78]	<0·001**
Physician	21 (2·9%)	0	0	NA	2 (14·3%)	6·13 [1·28–29·32]	0·023**

Table A2 Continued

Variables	All	Acute foot wound			Amputation procedure		
		n (%)	Odds ratio [95% CI]	*P* value	*n* (%)	Odds ratio [95% CI]	*P* value
Nurse	20 (2·7%)	1 (5·9%)	2·29 [0·29–18·14]	0·434	4 (28·6%)	17·55 [4·97–61·93]	<0·001**
Orthotist	4 (0·5%)	1 (5·9%)	14·81 [1·46–150·24]	0·023	1 (7·1%)	18·33 [1·77–188·18]	0·014
Other	9 (1·2%)	0	0	NA	0	0	NA
Foot disease history							
Previous foot ulcer	72 (9·8%)	1 (5·9%)	0·57 [0·07–4·33]	0·583	10 (71·4%)	26·41 [8·05–86·68]	<0·001**
Previous amputation	30 (4·1%)	0	0	NA	7 (50·0%)	30·17 [9·78–93·13]	<0·001**
Foot risk factors·							
Peripheral neuropathy	160 (22·0%)	1 (6·3%)	0·23 [0·03–1·77]	0·159*	10 (83·3%)	18·87 [4·09–87·03]	<0·001**
PAD				NA			<0·001**
Nil PAD	575 (79·0%)	16 (100%)	1·00		4 (33·3%)	1·00	
Mild PAD	69 (9·5%)	0	0	NA	0	0	NA
Moderate PAD	51 (7·0%)	0	0	NA	4 (33·3%)	12·15 [2·94–50·13]	0·001**
Ischaemic (critical PAD)	33 (4·5%)	0	0	NA	4 (33·3%)	19·69 [4·69–82·71]	<0·001**
Foot deformity	158 (22·4%)	3 (18·8%)	0·80 [0·22–2·83]	0·725	7 (63·6%)	6·31 [1·82–21·82]	0·004**
Foot disease disorders							
Foot ulcer	49 (6·7%)	–	–	–	12 (85·7%)	110·27 [23·80–510·82]	<0·001**
Acute foot wound	17 (2·3%)	–	–	–	2 (14·3%)	7·80 [1·60–37·94]	0·011**
Foot infection	24 (3·3%)	3 (27·3%)	12·30 [3·05–49·70]	<0·001**†	6 (66·7%)	77·22 [17·88–333·44]	<0·001**

GP, general practitioner; PAD, peripheral arterial disease; SD, standard deviation.

*95% CI are for prevalence figures.

†Explanatory variable excluded from multivariate model as considered not on causal pathway for outcome.

*$P < 0·2$; **$P < 0·05$.