Abstract

Chronic wounds are a significant problem in Australia. The healthcare-related costs of chronic wounds in Australia are considerable, equivalent to more than AUD $3.5 billion, approximately 2% of national health care expenditure. Chronic wounds can also have a significant negative impact on the health-related quality of life of affected individuals.

Studies have demonstrated that evidence-based care for chronic wounds improves clinical outcomes. Decision analytical modelling is important in confirming and applying these findings in the Australian context. Epidemiological and clinical data on chronic wounds are required to populate decision analytical models. Although epidemiological and clinical data on chronic wounds in Australia is available, this has yet to be systematically summarised.

To address these omissions and clarify the state of the existing evidence, we conducted a systematic review of the literature on key epidemiological and clinical parameters of chronic wounds in Australia. A total of 90 studies were selected for inclusion. This paper presents a synthesis of the evidence on the prevalence and incidence of chronic wounds in Australia, as well as rates of infection, hospitalisation, amputation, healing and recurrence.

Key Words

Australia, chronic wounds, systematic review, incidence, prevalence

Key Messages

- chronic wounds are a significant problem in Australia
- although epidemiological and clinical data are available on chronic wounds in Australia, these data have yet to be systematically summarised
- this systematic review identified 90 papers of the prevalence and incidence of chronic wounds in Australia, as well as rates of infection, hospitalisation, amputation, healing and recurrence
- this summary of the evidence is important in populating decision analytical models to inform the best-practice evidence-based management of chronic wounds

Chronic Wounds in Australia: A Systematic Review of Key Epidemiological and Clinical Parameters

Introduction

Chronic wounds are defined as wounds which have failed to heal, or to reach anatomic and functional integrity[1, 2]. There are four categories of chronic wounds, each with differing aetiologies: arterial ulcers (AUs), diabetic foot ulcers (DFUs), venous leg ulcers (VLUs) and pressure injuries (PIs). All categories are a significant problem in Australia. The costs of chronic wounds in Australia are considerable, equivalent to more than AUD $3.5 billion, approximately 2% of national health care expenditure[3]. Chronic wounds can also have a major negative impact on the health-related quality of life (HRQoL) of affected individuals.[4-8]

Studies have demonstrated that evidence-based care for chronic wounds improves clinical outcomes[9, 10] and is cost-effective[11-14]. However, economic models have been complicated by problems with input data. Decision analytical modelling is an approach for economic evaluation that ideally uses evidence from randomised controlled trials and other high quality sources.[15] The findings should provide evidence to support or reject a practice change against the criterion of value for money.[16] Epidemiological and clinical data on chronic wounds are required to populate decision analytical models about the cost-effectiveness of alternate models of care for chronic wounds.[17] The identification and synthesis of evidence to populate decision analytical models should emerge from a systematic review of the literature.[18]

Although epidemiological and clinical data on chronic wounds in Australia – including on prevalence and incidence, as well as rates of infection, hospitalisation, amputation, healing, and recurrence – are available, these data have yet to be summarised in a reproducible review. In current economic evaluations of evidence-based care for chronic wounds in Australia, values for these parameters originate from sources of varying quality, from small quasi-experimental studies to expert opinions. In many cases, key values are derived from studies published in other countries, and from older studies which lack relevance to the current health context.

To address this and clarify the state of the existing evidence, we conducted a systematic review of the literature on key epidemiological and clinical parameters of chronic wounds in Australia. Our aims were: to identify sources of primary data on the key epidemiological and clinical parameters for chronic wounds in Australia and to identify the knowledge gaps in the evidence which need to be addressed. Apart from informing economic modelling, such an integrated summary will have both clinical and public health applications. To the best of our knowledge, this review is the first to summarise the evidence on key clinical and epidemiological parameters relating to chronic wounds in Australia.

Methods

The review was conducted according to the guidelines recommended by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement[19] (Supporting Information Appendix S1).

Search strategy

Searches were conducted on the electronic databases CINAHL, Cochrane Library, EMBASE, PubMed and Scopus, up to May 2, 2017. Information on the search strings used is available in the review protocol (Appendix S2). In addition to the database searches, other sources were identified by searching official websites (such as the Australian Bureau of Statistics [ABS] and Australian Institute of Health and Welfare [AIHW]) and contacting various experts in the field. The reference lists of selected studies were screened for other relevant studies. Additional studies and doctoral theses were also identified through direct contact with authors.

Inclusion and exclusion criteria:

Criteria for inclusion and exclusion were defined prior to conducting the searches (Appendix S2). Sources were only included in the review if they were published, *and* if they reported primary data, *and* if they related to any chronic wound type(s) (AU, DFU, PI, VLU), *and* if they measured any of the outcome(s) of interest (prevalence, incidence, rates of infection, hospitalisation, amputation, healing and/or recurrence) *and* if they were conducted in Australia. Studies reporting wound types discretely and in combination were considered for inclusion. Studies conducted using routinely-collected health data as well as epidemiological studies on chronic wounds were considered for inclusion. Sources were limited by language (English). For relevancy in reporting, sources were also limited by date (January 1, 1990 to May 2, 2017 inclusive).

Screening

The sources retrieved were screened by title and abstract; those that appeared to meet the inclusion criteria were then retrieved and read in full-text. Two researchers (L.M. and S.R.) independently assessed the sources for eligibility. Where disagreements occurred, reviewers discussed these with the study's primary investigator (R.P.) to reach consensus.

Quality assessment

The quality of the selected sources was assessed using a tool designed to assess risk of bias in population-based prevalence studies[20], and modified for our study (Appendix S2).

Data extraction

A data extraction tool was developed by the research team to extract 10 data items about key features of the studies – including publication details, setting, design, sample, instrument and parameters of interest (Appendix S3). Data was extracted collaboratively by two researchers (L.M. and S.R.).

Two researchers (L.M. and S.R.) independently evaluated each of the sources for quality (Appendix S4). Again, disagreements were resolved via discussions with a senior team member (R.P.) until consensus was reached. The total quality score for each study was the sum of the scores for each individual assessment item. This was converted to a proportional quality score (the total quality score divided by the maximum score possible expressed as a percentage). A source received an unfavourable rating on any quality evaluation question where there was insufficient information reported within it to answer the evaluation question with confidence.[20]

Results

Out of 1274 records screened, 90 studies met the criteria for inclusion (Figure 1).

INSERT FIGURE 1

A summary of study characteristics for each of the 90 studies selected for inclusion is presented in Appendix S3. The studies were published from 1991[21] to 2016[22-27] inclusive. Cohorts from all six states and two territories in Australia were included in at least one study. The studies were a mix of retrospective and prospective designs, undertaken in acute healthcare facilities (e.g. hospitals), non-acute healthcare facilities (e.g. residential aged care settings) and/or community settings. Most studies were published in peer-reviewed journals, though a number of government reports and two Doctor of Philosophy theses were also included. The studies each reported on one or more parameters of interest, in relation to one or more chronic wound types.

Other key features of the studies are presented in Table 1.

INSERT TABLE 1

Prevalence

Arterial ulcers (AUs)

All of the studies on AUs reported prevalence. Most measured prevalence in people with lower-extremity ulcers specifically.[9, 28-35] Prevalence of AUs as a primary cause of ulceration in this population ranged from 3.0%[32] to 19.0%.[33] Other studies measured prevalence in people with all types of wounds (including chronic, surgical and traumatic wounds).[36, 37] Prevalence of AUs as a primary cause of ulceration in this population ranged from 1.0% [37] to 10.9%.[36] One study found that 74.5% of people with foot ulcers specifically had associated arterial disease.[28]

Diabetic foot ulcers (DFUs)

Many of the papers on DFUs reported prevalence. Some measured prevalence in people with lower extremity ulcers specifically.[9, 28, 32, 34, 35] Prevalence of DFUs as a primary cause of ulceration in this population ranged from 2.5%[28] to 12.0%.[35] One paper measured the prevalence of DFUs in people with all types of wounds (including chronic, surgical and traumatic wounds) and reported this to be 2.6%.[37]

A number of studies reported on the prevalence of DFUs in all people with diabetes[38-40]; this ranged from 1.2%[38] to 2.5%.[40] Prevalence of DFUs was reported at 1.0% in the first year of diabetes diagnosis.[40] One study found that, of people with diabetes-related foot complications, 32.6% had a DFU specifically.[41] Other studies reported diabetes mellitus was found in 48.5%[28] to 85.0%[42] of people with foot ulcers.

Venous leg ulcers (VLUs)

Most of the studies on VLUs reported prevalence. Some measured prevalence in people with lower-extremity ulcers specifically.[9, 28-35, 43] Prevalence of VLUs as a primary cause of ulceration in this population ranged from 1.0%[35] to 70.5%.[34] Two studies measured prevalence in people with all types of wounds (including chronic, surgical and traumatic wounds); the prevalence of VLUs as a primary cause of ulceration in this population was reported to be between 3.1%[37] and 53.1%.[36] In a large, population-based study in Perth, prevalence in persons ≥60 years was 3.3 per 1000.[20]

Pressure injuries (PIs)

Most of the studies on PIs reported prevalence. Some measured the prevalence of PIs in acute healthcare facilities (eg, hospitals).[33, 35, 44-68] Prevalence ranged from 0.2%[49] to 29.6%[59] in hospital settings. Other papers reported prevalence of PIs in specific populations in acute healthcare settings – including in medical patients: 3.8%,[68] in surgical patients: 4.1%,[68] in people undergoing coronary artery bypass graft: 2.9%,[69] in people undergoing orthopaedic hip replacement: 3.3,[69] in people with dementia: 4.0%,[68] in people receiving intensive care: 11.5%[24] to 50.0%,[70] and in long-stay patients (≥ 91 days): 25.0%.[67]

Some papers measured the prevalence of PIs in non-acute healthcare facilities (e.g. residential aged care settings).[26, 71-73] Prevalence ranged from 0.03%[73] to 25.9%.[72]

Some larger studies involved a mix of acute and non-acute health care facilities[26, 74]; these measured the prevalence of PIs to be between 9.1%[26] and 12.5%.[74] In people in acute and non-acute health care facilities who were classified as malnourished, the prevalence of PIs was measured at 31.5%.[75]

Many of the studies which measured PI prevalence in healthcare facilities reported on rates of healthcare- (versus community-) acquired PIs.[24, 26, 47, 50, 53, 54, 60, 64, 66, 76] One study found the prevalence of PIs on admission to hospital to be 4.9%, versus prevalence at discharge of 5.7%.[77] Another study measured the prevalence of medical device-related PIs in acute healthcare settings specifically to be 6.1%.[76]

Most of the studies which measured PI prevalence in acute and non-acute healthcare facilities also reported on PI staging.[24, 26, 37, 44, 45, 47, 51, 53, 55, 58-61, 63, 64, 66, 67, 69, 72-74, 78-82] The majority of PIs in these studies were at Stage I (non-blanchable erythema only). In a state-wide sample of acute and non-acute healthcare settings, the proportion of PIs in Stage I was estimated at 44.0%.[26]

Some of the studies measured the prevalence of PIs in the community. In studies involving general practitioners or community nursing services,[26, 80, 81] the prevalence of PIs – as a percentage of total presentations – ranged from 7.7%[26] to 42.3%.[80] One study measured prevalence in people with lower extremity ulcers in the community specifically, 5.0%.[43] Other papers reported on prevalence in people with wounds generally (including chronic, surgical and traumatic wounds)[30, 36, 37]; prevalence of PIs as a primary cause of ulceration in this population ranged from 6.0%[30] to 11.0%.[37]

It is important to acknowledge that some of the health care facilities involved in the above studies had PI improvement initiatives in place, whereas others did not. A number of the studies reported on declines, often significant, in PI prevalence as a result of such interventions.[53, 56, 57, 59, 60, 65, 70, 71, 75, 79, 83] For these studies, baseline (pre-intervention) PI prevalence is reported above.

Leg ulcers (LUs)

Some studies reported prevalence in people presenting to community healthcare services (31, 43, 84, 85); prevalence was reported at 1.1[84] to 7.0[43] per 1000 patient encounters, and at 0.1%[31] and 0.3%[85] of all patient encounters. Prevalence was estimated at 5.9 per 1000 in people aged ≥60 years[21], at 0.6% in people aged ≥65 years[31], and at 24 per 1000 in people aged ≥75 years.[43] Among people presenting to a community healthcare service with a wound (including chronic, surgical and traumatic wounds), 48.2% had a LU.[29] Two studies measured the prevalence of LUs in hospitalised patients; prevalence ranged from 2.3%[61] to 2.8%.[74] One study reported the prevalence of all-cause foot ulcers among hospitalised patients; 9.8% of people reported having a previous foot ulcer, and 6.3% were found to have a current foot ulcer.[27]

Incidence

Arterial ulcers (AUs)

None of the studies on AUs reported incidence.

Diabetic foot ulcers (DFUs)

Some of the papers on DFUs reported incidence. One study reported that 6.3% of people with diabetes mellitus developed a new DFU in a three month study period.[86] Another study found that 34.2% of people developed a new DFU in the study period, but this was a short report and the study period was not specified.[87] Another paper found that 6.3% of people with diabetes mellitus and neuropathy developed a DFU, compared with 0.5% of people with diabetes mellitus but without neuropathy.[88] An Australia-wide retrospective cross-sectional population survey found that 19.6% of people with diabetes mellitus had clinical features which placed them 'at risk' of developing a DFU[89]; however, this paper did not measure or estimate how many of these people actually developed a DFU.

Venous leg ulcers (VLUs)

None of the studies on VLUs reported on incidence.

Pressure injuries (PIs)

A number of the papers on PIs reported incidence.[23, 45, 46, 55, 59, 64, 67, 78, 79, 82, 83, 90, 91] These papers measured incidence over a variety of time-periods, from 7 days[55] to 12 months.[78] Some papers reported incidence of PIs in general medical patients in acute healthcare settings (e.g. hospitals)[46, 55, 59, 67, 79, 83, 90]; incidence ranged from 6.5% in 7 days (shortest time-period)[55] to 16.6% in 6 months (longest time-period).[83] Other papers reported incidence of PIs in people undergoing various surgical procedures[23, 45, 82, 91]; incidence ranged from 11.1% in 6 weeks (shortest time-period)[82] to 11.8% in 7 months (longest time-period).[23] One study reported on incidence of PIs in people in intensive care settings, at 30.4% in 12 months.[78]

One study estimated the risk of developing a healthcare-associated PI in a hospital to be between 9.8% and 12.0%, equating to 7.2 to 7.6 per 1000 bed days.[64]

Leg ulcers (LUs)

None of the studies on LUs reported incidence.

Infection

Arterial ulcers (AUs)

One paper found that 16.7% of the people with AUs showed signs of infection; however, this equated to just 1 out of 6 people with AUs included in the study.[9]

Diabetic foot ulcers (DFUs)

Three of the papers on DFUs reported rates of infection[9, 41, 92]; between 14.6%[41] and 49.7%[92] of DFUs showed clinical sign(s) of infection.

Venous leg ulcers (VLUs)

Three of the papers on VLUs reported rates of infection[9, 93, 94] In groups receiving standard care or baseline cohorts, infection ranged from 5.9%[93] to 58.1%.[94]

None of the included studies reported rates of infection for PIs and LUs.

Hospitalisation

Arterial ulcers (AUs)

None of the studies on AUs reported rates of hospitalisation.

Diabetic foot ulcers (DFUs)

One paper found that an infected DFU was the primary cause of hospitalisation in 79 admissions per 100 000 person years.[95] This study also reported that the median duration of hospital stay once admitted with DFU-related complication(s), and particularly infection, was 29.0 days.[95] Another study measured the incidence of first-ever hospital admission for DFU to be 5.21 per 1000 patient-years.[38] Another study found that 1.8% of people with diabetes mellitus had been hospitalised for complications related to a DFU.[39]

Venous leg ulcers (VLUs)

One study reported that 6.0% of people with VLUs were admitted to hospital, due to failure of the wound to heal and / or wound deterioration.[32]

Pressure injuries (PIs)

None of the studies on PIs reported rates of hospitalisation; rather, reporting focused on mean length of hospital stay. One study found that the mean length of hospital stay for general medical and surgical patients who developed a PI was 61.1 days.[65] Another reported the mean length of hospital stay for general medical and surgical patients who developed a PI was 34.0 days, versus 25.0 days for people who did not develop a PI.[67] Another study measured the hospital stay for people undergoing coronary artery bypass graft who developed a PI at 22.4 days, versus 12.7 days for patients who did not develop a PI, and for people undergoing an orthopaedic hip replacement who developed a PI at 31.2 days, versus 19.7 days for patients who did not develop a PI.[69]

Leg ulcers (LUs)

Two papers on LUs reported rates of hospitalisation; these studies found that between 4.5%[34] and 13.8%[32] of people with LUs were admitted to hospital because of complications with their wound.

Amputation

Arterial ulcers (AUs)

None of the studies on AUs reported on rates of amputation.

Diabetic foot ulcers (DFUs)

A number of the studies on DFU reported on rates of DFU-related amputation.[22, 92, 95-98] The studies measured rates of ≥1 minor amputation (below the ankle) to range from 2.1%[92] to 36.5%,[96] and rates of ≥1 major amputation (above the ankle) to range from 0.5%[92] to 23.0%.[96] One study found that in people who had one minor amputation for a DFU-related complication, 26.0% also had at least one subsequent minor amputation and 18.5% had at least one subsequent major amputation.[95]

One study reported that DFU was a significant independent predictor of first-ever lower-extremity amputation in people with diabetes mellitus (hazard ratio [95% CI]: 5.56 [1.24-25.01]).[97] Another found that DFU was the major cause of amputation in 17.2% of all amputations performed in a major metropolitan hospital in a two-year period.[99] Another study concluded that of the 7.0% of people with diabetes mellitus who experienced an amputation (minor or major), 34.0% were the direct result of a DFU.[98]

Venous leg ulcers (VLUs)

None of the studies on VLUs reported on rates of amputation.

Pressure injuries (PIs)

None of the included studies on PIs reported on rates of amputation.

Leg ulcers (LUs)

One study found that among people with LUs receiving standard care, 13.9%[35] received an amputation.

Healing

Arterial ulcers (AUs)

Three studies reported on median time to healing for AUs. One study reported 33.3% of AUs healed in ≤12 months.[36] In another study, median time to healing of AUs was measured at 107.0 days.[37] In a third study, data about median time to healing was presented graphically and could not be quantified.[9]

Diabetic foot ulcers (DFUs)

The studies on DFUs reported healing in a variety of ways. Some measured healing in a given period. One study reported 74.8% of DFUs in people receiving standard care healed in ≤28 days.[100] Another found 47.0% of DFUs healed in 12 weeks and 72.0% healed in 20 weeks.[41] Three studies reported median time-to-healing for DFUs in people receiving standard care,[37, 41, 42] ranging from 6.0 weeks[42] to 15.7 weeks.[41] In one study, time-to-healing for DFUs was presented graphically and could not be quantified.[9]

Venous leg ulcers (VLUs)

The studies on VLUs also reported healing in a variety of ways. Some reported healing in groups receiving standard care – at ≤12 weeks,[93, 101-103] ranging from 23.5%[93] to 45.1%[103]; at 24 weeks: 38.5%[104]; at 6 months: 73.6%[32]; and at 12 months: 67.7%.[36] Some reported healing in groups receiving specialist care – at ≤12 weeks,[9, 93, 101-103] ranging from 43.6%[93] to 73.0%[103]; and at 24 weeks: 57.6%.[104] In a group receiving specialist care, 96.8% of low-risk patients, and 25.0% of high-risk patients, healed in 24 weeks.[105]

Other studies reported healing of VLUs in comparison groups receiving different specialist interventions – for example, three-layer versus four-layer compression bandaging (72.0% versus 84.0% healing in 24 weeks),[106] and with different types of dressings, ranging from 58.7% to 86.0% in 9 months.[107]

One study found the median time to healing for VLUs to be 63.9 days.[37] In one study, time-to-healing for VLUs was presented graphically and could not be quantified.[9]

Pressure injuries (PIs)

The papers on PIs reported healing in a variety of ways. One study found the average time to healing of a PI was 57.9 days; average time to healing for Stage I PIs was 45.6 days, Stage II PIs was 56.5 days, Stage III PIs was 58.9 days and Stage IV PIs was 58.3 days.[37] Another study reported that among people presenting to a community wound clinic with a PI, 100.0% had healed in ≤12 months.[36] A third study found that with an intensive nutrition intervention, 58.1% of malnourished people with a PI healed within the period of their hospital admission, with length of admission averaging 14.0 days.[25]

Leg ulcers (LUs)

Studies on LUs reported outcomes related to healing in a variety of ways. Studies reported that, with standard care, between 20.3%[31] and 38.8%[32] of LUs healed in 3 months, 67.0%[32] healed in 6 months, and 92.6%[32] healed in 12 months. Another study reported that in uncomplicated LUs, mean time to healing was 4.6 weeks, and in LUs with one or more complications, mean time to healing was 23.9 weeks.[34] In a control group, mean rate of healing by ulcer area was reported to be 6.3% per week.[35] The mean duration of LUs prior to healing among the people participating in one study was reported to be 9.0 years.[31]

Recurrence

Arterial ulcers (AUs)

None of the studies on AUs reported rates of recurrence.

Diabetic foot ulcers (DFUs)

One study found that 3.6% of people who presented to a health care service with a DFU had had at least one previous DFU.[92] Another study reported a 37.0% rate of recurrence.[42]

Venous leg ulcers (VLUs)

The studies on VLUs defined and measured rates of recurrence in multiple ways. In most studies, recurrence was defined as a new ulcer developing after the patient healed, and could be on the other leg or other location. Some measured the number of people with a current VLU who reported a previous VLU[21, 93, 94, 108]; this ranged from "half", assumed to be 50.0%,[108] to 81.7%.[94] Other studies measured recurrence after healing within 5 weeks: 23.1%[103]; at 3 months, ranging from 5.6%[9] to 36.0%[109]; at 6 months: 73.5%[32]; and at 12 months,[9, 109] ranging from 16.7%[9] to 20.0%.[109] Other studies reported a median time to recurrence, ranging from 11.1 weeks[94] to 63.0 weeks.[9]

Pressure injuries (PIs)

None of the studies on PIs reported rates of recurrence.

Leg ulcers (LUs)

One study found that 65.0% of people who presented to a community healthcare service with an LU had at least one previous LU.[28]

Study Quality and Risk of Bias

Supplementary Material S4 sets out the quality assessment and scoring results for each of the studies selected for inclusion. Overall quality scores ranged from 30% to 90%. Four of the 90 included studies scored 90%[27, 51, 61, 66]; we concluded that these studies had relatively high internal and external validity and risk of bias was considered minimal in these studies. Twenty-two of the studies scored ≤50% in terms of quality; we concluded risk of bias was relatively high for these studies, particularly regarding representativeness of the study population, selection bias, non-response bias and lack of use of an acceptable case definition. The quality of the included studies was moderate, with an average quality score of 64%.

Discussion

To the best of our knowledge, this is the first review of published studies reporting on the prevalence, incidence and rates of infection, hospitalisation, amputation, healing and recurrence of chronic wounds in Australia. A total of 90 studies were included.

A key finding to emerge from this review is that all types of chronic wounds – AUs, DFUs, VLUs and PIs – are highly prevalent in Australia. There was a considerable amount of data on prevalence of all wound types in a variety of cohorts. However, of the studies selected for inclusion, most were published prior to 2010 and not representative of the Australian population. Given population ageing and the obesity epidemic, prevalence of chronic wounds has probably increased in recent years. Prevalence was reported in specific populations – for example: in people with lower extremity ulcers, people presenting to community wound services, people admitted to hospital, and people with comorbidities such as diabetes mellitus. None of the studies selected for inclusion gave an estimate of the prevalence of chronic wounds in the general Australian population. As a result, it remains difficult to estimate the number or people currently affected with chronic wounds in Australia.

It is interesting to compare our findings about the prevalence of chronic wounds in Australia – a key parameter for economic modelling – to the international literature. A recent literature review involving 69 international studies[110] returned the following findings:

Arterial ulcers (AUs)

Internationally, the prevalence of AUs in the community was 0.02% to 0.35%[110] (compared with our finding of 3.0% to 19.0% in people with lower extremity ulcers, and 0.7% to 10.9% in people with wounds generally). This review supported our finding of a paucity of evidence on the prevalence (and incidence) of arterial ulcers.[110]

Diabetic foot ulcers (DFUs)

Internationally, the prevalence of DFUs in acute healthcare facilities (e.g. hospitals) ranged from 1.2% to 20.4%, and in non-acute healthcare facilities (e.g. residential aged care settings) it ranged from 0.02% to 9.0%[110] (compared with our finding of 2.5% to 12.0% in people with lower extremity ulcers, and 2.6% in people with wounds generally).

Venous leg ulcers (VLUs)

Internationally, the prevalence of VLUs in acute healthcare facilities (e.g. hospitals) was 0.05%, in non-acute healthcare facilities (e.g. residential aged care settings) it was 2.5%, and in the community it ranged from 0.05% to 1.0%[110] (compared with our finding of 1.0% to 70.5% in people with lower extremity ulcers, and 2.3% to 53.1% in people with all types of wounds).

Pressure injuries (PIs)

The prevalence of PIs in acute healthcare facilities (e.g. hospitals) ranged from 1.1% to 26.7%[110] (compared with our finding of 0.2% to 29.6%); in people receiving intensive care it ranged from 13.1% to 28.7%[110] (compared with our finding of 11.5% to 50.0%); and in non-acute healthcare facilities (e.g. residential aged care settings) it ranged from 7.6% to 53.2%[110] (compared with our finding of 0.03% to 25.9%).

The same problem we encountered with reporting prevalence – noted above, that this was population-specific – was also found with incidence. Again, there was a considerable amount of data on the incidence of all wound types, in a variety of cohorts; however, incidence was typically reported in specific populations (such as those listed above). Aside from one study which gave an estimated risk of developing a healthcare associated PI during a hospital admission,[64] none of the studies reported incidence rates of PIs in the Australian general population. Additionally, incidence was measured over a variety of time-frames, making comparison with the international literature review described above[110] difficult. There were some difficulties with determining the difference between incidence and recurrence; in all instances, we used the same terminology as the study authors.

This review also returned important findings in relation to the clinical outcomes of interest – rates of infection, hospitalisation, amputation, healing and recurrence. The literature selected for inclusion reported highly variable rates of infection for most chronic wound types; this was possibly due to problems with the definition and diagnosis of 'infection', discussed later. For most chronic wound types, rates of hospitalisation were relatively low, however once a person was admitted to hospital for complications associated with a chronic wound, or if they developed a chronic wound whilst hospitalised (e.g. a PI), their length of stay was likely to be considerable.

Rates of amputation were relevant mainly to DFUs, and the rates of both minor and major amputation for people with this type of chronic wound were high. There was a considerable amount of data on rates of healing for all wound types, and again this was highly variable; this was possibly due to problems with treatment and confounding factors affecting rates of healing, again discussed later. Finally, there were limited data on recurrence, but available data suggests the risk of recurrence is high for DFUs and VLUs in particular.

Although some data was available on a few parameters for all chronic wound types – AUs, DFUs, VLUs and PIs –in the studies selected for inclusion, there was a particularly large amount of data on PIs. Indeed, 60% of the studies identified for inclusion (n = 52) reported on PIs. There were a moderate number of studies on VLUs (n = 24) and DFUs (n = 23) papers, but a relative paucity of data on AUs (n = 11). This is an important finding, considering this review suggests AUs are not significantly less prevalent than DFUs and perhaps VLUs, by some measures. The apparent paucity of literature on AUs may also be related to the inconsistencies, and lack of clarity, in defining different ulcer types – particularly, distinguishing between AUs and VLUs.

This review also found an absence of data for a number of key clinical outcomes. There was no data reported in the studies selected for inclusion on rates of infection in PIs, rates of amputation in AUs, VLUs or PIs, and rates of recurrence in AUs and PIs. Of note was the limited data available on rates of hospitalisation due to complications for specific types of chronic wounds. This represents an important gap in the existing knowledge, and a possible focus for future Australian research.

As noted, the majority of the studies were small local (single-site) or slightly larger regional (multi-site) studies. There were only a few state-wide studies, fewer multi-state studies and two nation-wide studies[43, 89] identified. Most studies included small cohorts from specific locations – often, a single or small group of healthcare facilities – limiting generalisability. This is particularly problematic as the quality assessment indicated the likelihood of non-response bias and selection bias in many of the studies was high.

The few larger studies also had limitations. The state-wide and multi-state studies focused on New South Wales[26, 43, 65, 68, 71, 72] Queensland,[24, 42, 49, 65] South Australia,[71, 72] Victoria[49, 65, 66, 71, 72, 94] and Western Australia,[40, 61, 65, 71, 72, 74] with the less-populous states and territories of Tasmania, the Northern Territory and the Australian Capital Territory nearly entirely overlooked. Additionally, two nation-wide studies included had significant limitations. The first did not directly measure any of the outcomes of interest for this review, but instead reported on the concept of people with diabetes mellitus 'at risk' of developing a DFU.[89] The second was reported as a conference abstract only.[42]

Study Limitations

The findings of this systematic review should be interpreted in light of a number of limitations of our review. There were significant problems with how the different chronic wound types (AU, DFU, VLU and PI) were defined in the studies. Some used clear definitions of wound types – based on an international consensus definition (e.g. those contained in a reliable and valid assessment tool) or clear diagnostic criteria – but many did not. This made it difficult to determine the accuracy of outcomes reported about a particular wound type. This was especially problematic in the retrospective studies, where it was typically difficult to determine how chronic wounds were assessed, their aetiology diagnosed and if this was a standardised process for all participants included in the study. These studies frequently received low quality scores for this reason. There were also problems with the definitions used by the small number of studies which considered 'leg ulcers' as a group; some of these studies included in their definition of 'leg ulcers' other types of wounds such as skin tears, burns and malignancies, etc. Again, for this reason these studies typically received relatively low quality scores.

Many of the studies used non-standardised definitions for the other key outcomes – in particular, of wound infection, but also of hospitalisation, healing and recurrence. This lead to outcomes being measured in different ways – for example: hospitalisation may have been measured as rate of hospital admission or length of stay. Similarly, recurrence may have been measured as recurrence of a known wound, or history of previous chronic wound(s) of the same aetiology as a current wound. Non-standardised definitions also resulted in variability in outcomes between studies – for example: the two studies reporting on rates of infection in VLUs, which included comparable cohorts and involved similar research methods, reported highly discrepant rates of infection: 5.9%[93] and 58.1%.[94] Different definitions precluded a meta-analysis, and resulted in difficulties reporting results in meaningful ways.

There were also problems with the way in which healing was measured and reported in many of the studies. Some studies compared rates of healing in standard care (control) versus specialist care (intervention) groups, but many did not. A large number of studies reported 'healing' without specifying the treatment(s), if any, used on the wound. This outcome was therefore highly exposed to confounding, and difficult to report with accuracy.

A number of studies on DFUs originally identified for inclusion in the review[111-113] were subsequently excluded, because they grouped DFUs with other diabetes-related foot complications – for example: peripheral neuropathy, peripheral vascular insufficiency, cellulitis, Charcot arthropathy, or osteomyelitis. When reporting on outcomes such as amputation, it was not possible to determine in these studies if amputation was due to a DFU specifically (as per our inclusion criteria) or other diabetes-related foot complications more generally, or even a combination of both. For this reason, these studies were excluded.

There were also some limitations with the review process which must be acknowledged. A limited number of databases were searched, and it is possible that sources, including grey literature, published elsewhere were missed. The data extraction tool was not validated. Although three researchers were involved in the assessment of study quality process (L.M., S.R., R.P.), only one (L.M.) conducted the final synthesis of the data, and no rigorous inter-rater checks were conducted.

Conclusion and Recommendations

In this paper we have presented the method and findings of a reproducible literature review regarding evidence on important epidemiological parameters of prevalence and incidence, and key clinical parameters of rates of infection, hospitalisation, amputation, healing and recurrence of chronic wounds in Australia. We show there are large gaps and limitations in the existing evidence. The knowledge gaps in some key parameters need to be addressed as a matter of urgency. The effective implementation and evaluation of evidence-based wound care depends on the availability of reliable and comparable information and as better quality evidence becomes available, future economic modelling will be more accurate and reliable.

We recommend targeted primary research to establish the epidemiological profile of chronic wounds in Australia. A nationally representative prevalence survey should be conducted at regular intervals and in line with international best practice to identify baseline prevalence and size of the problem in Australia. In addition, a national wound registry should be established to provide real patient data on clinical wound outcomes, and facilitate comparative effectiveness research to identify patients needing advanced treatment. For this to be achieved, a number of barriers to collaboration between sectors must be overcome – including establishment costs and jurisdictional

funding issues, sensitivities around data sharing, and the challenge of the sustainability of chronic wound services.

Acknowledgements and Funding Statement

The authors would like to acknowledge the support of the Australian Government's Cooperative Research Centres Program. The Wound Management Innovation Cooperative Research Centre (WMI CRC) received funding from the Australian Government, Curtin University of Technology, Queensland University of Technology, Smith & Nephew Pty Limited, Southern Cross University, University of South Australia, Wounds Australia, Blue Care, the Department of Health South Australia, the Department of Health Victoria, Ego Pharmaceuticals Pty Ltd, Metropolitan Health Service/Wounds West, Queensland Health, Royal District Nursing Service Limited, Royal Melbourne Institute of Technology, and Silver Chain Group. The funders had no role in the design of the study and collection, analysis, and interpretation of data and writing, and submitting the manuscript for publication.

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Figure 1

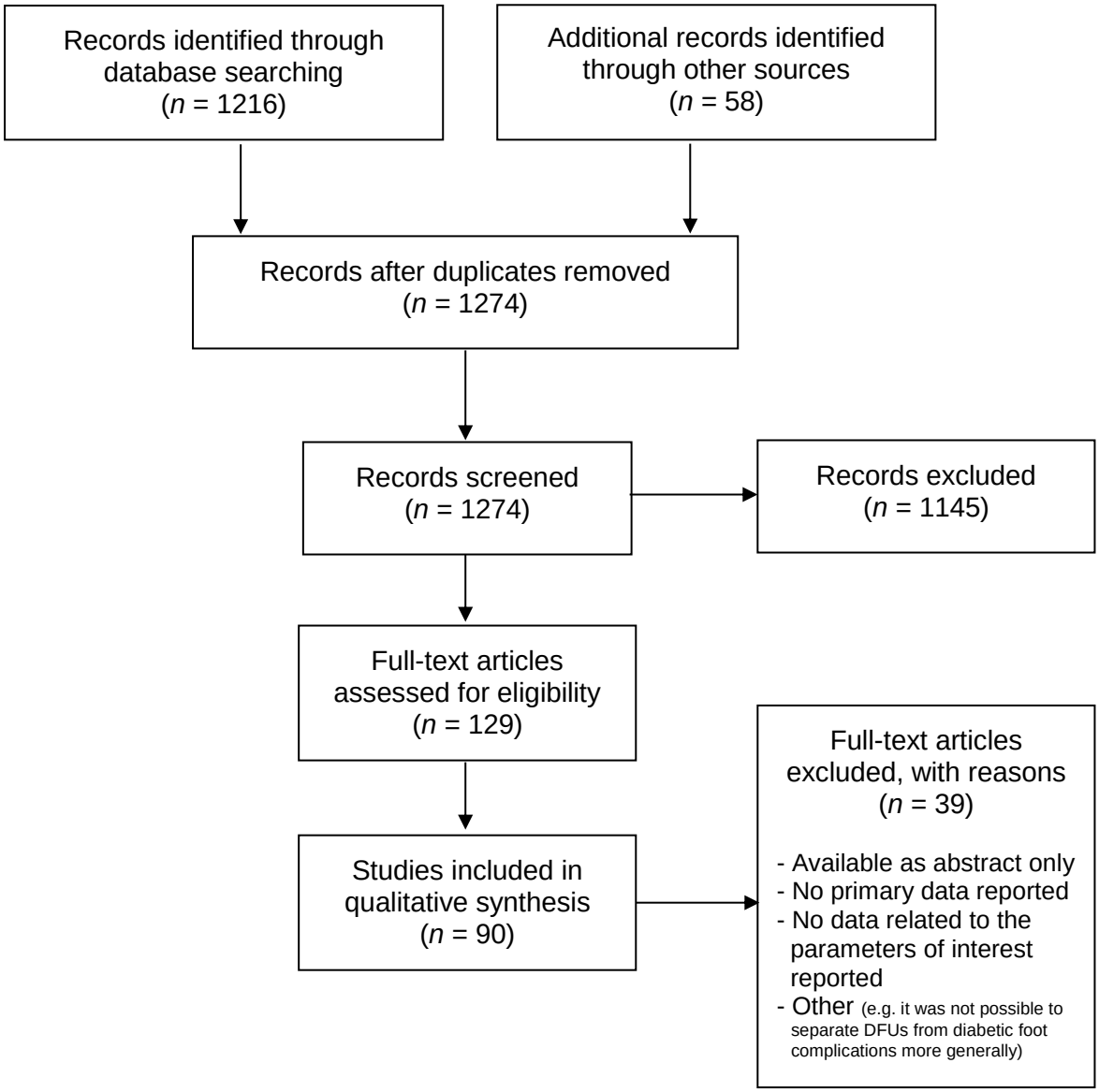

Figure 1: The PRISMA flowchart illustrating study selection

Table 1

Chronic Wound Type	Number of Papers	Scope of Papers	States / Territories Included	Range of Quality Scores
Arterial ulcers (AUs)	11 (9, 28-37)	All studies included small local (single-site) or regional (multi-site) populations, in single states	NSW (31); QLD (9, 34); TAS (33); VIC (37); WA (28-30, 32, 35, 36)	40% (34, 36) to 80% (35)
Diabetic foot ulcers (DFUs)	23 (9, 22, 28, 32, 34, 35, 37-42, 86-89, 92, 95-100)	Most studies included small local (single-site) or regional (multi-site) populations in single states / territories; there were two studies which included state-wide cohorts (40, 42), and one which included a multi-state cohort (89)	NSW (88, 92); NT (95, 96, 98); QLD (9, 22, 34, 42), VIC (37, 41, 86, 87, 100); WA (28, 32, 35, 38-40, 97, 99) There was one study which included a multi-state (89)	30% (87) to 80% (35, 38, 39)

Venous leg ulcers (VLUs)	24 (9, 21, 28-37, 43, 93, 94, 101-109)	Most studies included small local (single-site) or regional (multi-site) populations in single states; there were also studies which included state-wide cohorts (94) and two studies which included a multi-state cohort (43, 103)	NSW (31); QLD (9, 34, 93, 101, 102, 104-106, 109); TAS (33); VIC (37, 94, 108); WA (21, 28-30, 32, 35, 36, 107) There were two studies which included a multi-state cohort (43, 103)	40% (34, 36) to 80% (35, 106)

Pressure injuries (PIs)	52 (23-26, 30, 33, 35-37, 43-83, 90, 91)	Most studies included small local (single-site) or regional (multi-site) populations in single states; there were a number which included state-wide or multi-state cohorts (24, 26, 43, 49, 61, 66, 68, 74)	ACT (79); NSW (26, 43, 51, 53, 55, 68-70); QLD (23-25, 44-46, 48, 50, 52, 57, 73, 75-78, 91); SA (59); TAS (33, 62); VIC (37, 47, 54, 56, 58, 63, 66, 83); WA (30, 35, 36, 60, 61, 64, 67, 74, 80-82, 90) There was one study where the location was unclear (71) There were a number of studies which included multi-state cohorts (43, 49, 65, 72)	40% (36, 48, 52, 56, 76, 91) to 90% (51, 66)

Leg ulcers (LUs) (generally, without dividing these into wounds of arterial, diabetic, venous or other aetiology)	11 (29, 31, 32, 34, 35, 42, 43, 61, 74, 84, 85)	Most studies included small local (single-site) or regional (multi-site) populations in single states; there were three studies which included state-wide or multi-state cohorts (43, 61, 74)	NSW (31, 43, 85); QLD (34, 42); WA (29, 32, 35, 61, 74, 84)	40% (34) to 90% (42, 61)

Table 1: Overall summary of characteristics of included studies

Supplementary Material 1 (S1)

PRISMA Checklist

Section/topic	#	Checklist item	Reported on page #
TITLE			
Title	1	Identify the report as a systematic review, meta-analysis, or both.	Title
ABSTRACT			
Structured summary	2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number.	Abstract
INTRODUCTION			

Rationale	3	Describe the rationale for the review in the context of what is already known.	Introduction: paragraphs 1, 2, 3,
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	Introduction: paragraph 4
METHODS			
Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.	Not applicable
Eligibility criteria	6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.	Methods: paragraph 3 and S2

Information sources	7	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.	Method: paragraph 2
Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	Methods: paragraphs 1-7 and S2
Study selection	9	State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis).	Methods: paragraphs 3-7 and S2
Data collection process	10	Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.	Methods: paragraph 6 and S2

Data items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.	Methods: paragraph 6 and S2
Risk of bias in individual studies	12	Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis.	Methods: paragraph 5 and S2
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means).	Methods: paragraph 3 and S2
Synthesis of results	14	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I^2) for each meta-analysis.	Not applicable

Risk of bias across studies	15	Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies).	Study Quality: paragraph 1
Additional analyses	16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.	Not applicable
RESULTS			
Study selection	17	Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram.	Results: paragraph 1 and Figure 1
Study characteristics	18	For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations.	S3

Risk of bias within studies	19	Present data on risk of bias of each study and, if available, any outcome level assessment (see item 12).	S4
Results of individual studies	20	For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group (b) effect estimates and confidence intervals, ideally with a forest plot.	S3, S4
Synthesis of results	21	Present results of each meta-analysis done, including confidence intervals and measures of consistency.	Results: throughout
Risk of bias across studies	22	Present results of any assessment of risk of bias across studies (see Item 15).	Discussion: paragraphs 8, 13, 14, and Study Limitations: throughout and S4

(S4-S9)Additional analysis	23	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]).	Not applicable
DISCUSSION			
Summary of evidence	24	Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., healthcare providers, users, and policy makers).	Discussion: paragraphs 1-14
Limitations	25	Discuss limitations at study and outcome level (e.g., risk of bias), and at review-level (e.g., incomplete retrieval of identified research, reporting bias).	Discussion: paragraphs 8, 13, 14, and Study Limitations: throughout

Conclusions	26	Provide a general interpretation of the results in the context of other evidence, and implications for future research.	Conclusion
FUNDING			
Funding	27	Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review.	Title Page

Supplementary Material 2 (S2)

Review protocol

Methods of the review: The study was conducted according to the PRISMA statement.

Primary database: Five electronic databases (CINAHL, Cochrane Library, EMBASE, PubMed and Scopus).

Search terms:

Database	Search Terms

CINAHL	((TI (Prevalence OR Incidence OR Epidemiology OR Mortality OR Recurr* OR Hospitali* OR Heali*OR heale* OR Amputat*)) OR AB ((Prevalence OR Incidence OR Epidemiology OR Mortality OR Recurr* OR Hospitali* OR heali* OR heale* OR Amputat*))) AND ((AB (Australia OR “Capital Territory” OR “Australian Capital Territory” OR Canberra OR “Northern Territory” OR Darwin OR “New South Wales” OR NSW OR Sydney OR Queensland OR Brisbane OR QLD OR “South Australia” OR Adelaide OR Tasmania OR Hobart OR Victoria OR Melbourne OR “Western Australia” OR Perth)) OR TI ((Australia OR “Capital Territory” OR “Australian Capital Territory” OR Canberra OR “Northern Territory” OR Darwin OR “New South Wales” OR NSW OR Sydney OR Queensland OR Brisbane OR QLD OR “South Australia” OR Adelaide OR Tasmania OR Hobart OR Victoria OR Melbourne OR “Western Australia” OR Perth))) AND (AB ((Diabet* OR foot OR pressure OR decubitus OR venous OR varicose OR stasis OR “insufficient artery” OR arteri* OR artery OR chronic)) OR TI ((Diabet* OR foot OR pressure OR decubitus OR venous OR varicose OR stasis OR “insufficient artery” OR arteri* OR artery OR chronic))) AND (AB ((Ulcer* OR wound* OR injur*)) OR TI ((Ulcer* OR wound* OR injur*)))

Cochrane	(prevalence:ti,ab or incidence:ti,ab or epidemiology:ti,ab or mortality:ti,ab or recurr*:ti,ab or hospitali*:ti,ab or heali*:ti,ab or heale*:ti,ab or amputat*:ti,ab) and (Diabet*:ti,ab OR foot:ti,ab OR pressure:ti,ab OR decubitus:ti,ab OR venous:ti,ab OR varicose:ti,ab OR stasis:ti,ab OR “insufficient artery”:ti,ab OR arteri*:ti,ab OR chronic:ti,ab) and (Ulcer*:ti,ab OR wound*:ti,ab OR injur*:ti,ab) and (Australia:ti,ab or "Capital Territory":ti,ab or "Australian Capital Territory":ti,ab or Canberra:ti,ab OR "Northern Territory":ti,ab OR Darwin:ti,ab OR "New South Wales":ti,ab OR NSW:ti,ab OR Sydney:ti,ab OR Queensland:ti,ab OR Brisbane:ti,ab OR QLD:ti,ab OR "South Australia":ti,ab OR Adelaide:ti,ab OR Tasmania:ti,ab OR Hobart:ti,ab OR Victoria:ti,ab OR Melbourne:ti,ab OR "Western Australia":ti,ab OR Perth:ti,ab)

EMBASE	prevalence:ab,ti OR incidence:ab,ti OR epidemiology:ab,ti OR mortality:ab,ti OR recurrence:ab,ti OR hospitali:ab,ti OR heali*:ab,ti OR heale*:ab,ti OR amputat*:ab,ti AND (Diabet*:ab,ti OR foot:ab,ti OR pressure:ab,ti OR decubitus:ab,ti OR venous:ab,ti OR varicose:ab,ti OR stasis:ab,ti OR arteria*:ab,ti OR arterie*:ab,ti OR chronic:ab,ti) AND (ulcer*:ab,ti OR wound*:ab,ti OR injur*:ab,ti) AND (australia:ab,ti OR 'capital territory':ab,ti OR 'australian capital territory':ab,ti OR canberra:ab,ti OR “Northern Territory”:ab,ti OR Darwin:ab,ti OR “New South Wales”:ab,ti OR NSW:ab,ti OR Sydney:ab,ti OR Queensland:ab,ti OR Brisbane:ab,ti OR QLD:ab,ti OR “South Australia”:ab,ti OR Adelaide:ab,ti OR Tasmania:ab,ti OR Hobart:ab,ti OR Victoria:ab,ti OR Melbourne:ab,ti OR “Western Australia”:ab,ti OR Perth:ab,ti)

PubMed	(Prevalence[Title/Abstract] OR Incidence[Title/Abstract] OR Epidemiology[Title/Abstract] OR Mortality[Title/Abstract] OR Recurr*[Title/Abstract] OR Hospitali*[Title/Abstract] OR Heale*[Title/Abstract] OR Heali*[Title/Abstract] OR Amputat*[Title/Abstract]) AND (Diabet*[Title/Abstract] OR foot[Title/Abstract] OR pressure[Title/Abstract] OR decubitus[Title/Abstract] OR venous[Title/Abstract] OR varicose[Title/Abstract] OR stasis[Title/Abstract] OR arteria*[Title/Abstract] OR arterie*[Title/Abstract] OR artery[Title/Abstract] OR chronic[Title/Abstract]) AND (Ulcer*[Title/Abstract] OR wound*[Title/Abstract] OR injur*[Title/Abstract]) AND (Australia[Title/Abstract] OR “Capital Territory”[Title/Abstract] OR “Australian Capital Territory”[Title/Abstract] OR Canberra[Title/Abstract] OR “Northern Territory” [Title/Abstract] OR Darwin[Title/Abstract] OR “New South Wales”[Title/Abstract] OR NSW[Title/Abstract] OR Sydney[Title/Abstract] OR Queensland[Title/Abstract] OR Brisbane[Title/Abstract] OR QLD[Title/Abstract] OR “South Australia” [Title/Abstract] OR Adelaide[Title/Abstract] OR Tasmania[Title/Abstract] OR Hobart[Title/Abstract] OR Victoria[Title/Abstract] OR Melbourne[Title/Abstract] OR “Western Australia”[Title/Abstract] OR Perth[Title/Abstract])

Scopus	(TITLE-ABS-KEY (Prevalence OR Incidence OR Epidemiology OR Mortality OR Recurr* OR Hospitali* OR Heali* OR Heale* OR Amputat*)) AND (TITLE-ABS-KEY (Diabet* OR foot OR pressure OR decubitus OR venous OR varicose OR stasis OR arterie* OR arteria* OR arteri * OR chronic)) AND (TITLE-ABS-KEY (Ulcer* OR wound* OR injur*)) AND (TITLE-ABS-KEY (Australia OR “Capital Territory” OR “Australian Capital Territory” OR Canberra OR “Northern Territory” OR Darwin OR “New South Wales” OR NSW OR Sydney OR Queensland OR Brisbane OR QLD OR “South Australia” OR Adelaide OR Tasmania OR Hobart OR Victoria OR Melbourne OR “Western Australia” OR Perth))

Inclusion and Exclusion Criteria

Inclusion	Exclusion
Published studies or reports	Unpublished studies or reports
Primary data sources	Secondary data sources (abstracts, letters, editorials, reviews, protocols, etc.)
Related to outcomes of interest: prevalence, incidence, infection, hospitalisation, amputation, healing *or* recurrence (search terms: Group 1)	Related to other outcomes
Related to chronic wounds: arterial ulcers, diabetic foot ulcers, pressure injuries *or* venous leg ulcers (search terms: Group 2, Group 3)	Related to other types of wounds (e.g. surgical wounds, acute wounds)
Undertaken in Australia (at any level: national, state / territory or regional / local)	Studies undertaken in other countries; studies where Australia was included but

(search terms: Group 4)	results were combined with other countries

Additional Information on Eligibility Criteria

Articles initially excluded if: (1) they were duplicates, or (2) if the title clearly demonstrates that the focus of the article is not on clinical and epidemiological parameters or chronic wounds in an Australian setting. Articles are then excluded based on the following:

- The study is a secondary data source
- The study relates to surgical wounds or acute wounds only
- The study is conducted internationally where Australia was included but results were combined with other countries and separate estimates were not available for Australia
- The study contained ambiguous data (e.g. it is not possible to separate DFUs from diabetic foot complications more generally)

Study inclusion/exclusion is completed independently (SR and LM). Results are reviewed and any disagreement is recorded. Results are discussed with RP to reach consensus.

Data Abstraction Form

Identification of Study

1. Record the first authors' surname
2. Record the year of publication

Characteristics of Study

3. Record the state of publication
4. Record the setting
5. Record the study type and length
6. Record the sample type
7. Record the sample size
8. Record the quality score

Other Data

9. Record estimates for epidemiological and / or clinical parameters

Quality Assessment

The quality of the selected sources was assessed using a tool designed to assess risk of bias in population-based prevalence studies (20), and modified for our study. In Question 2, the definition of 'representativeness' was adjusted; consistent with the focus of this review, this was evaluated according to whether the study population was: (a) representative of an Australian state or territory population, (b) representative of an urban and rural population, or (c) not representative. In Question 7, which asks about the measurement of the outcomes(s) of interest, the use of either a reliable and valid tool *or* other standard clinical diagnostic

criteria was considered suitable. Question 9 on the original tool, which asks about length a prevalence period, was deleted due to lack of relevance to this review's broader focus.

EXTERNAL VALIDITY
1) Was the study's target population a close representation of the state/territory population in relation to relevant variables, e.g. age, sex? • Representative for Australian state/territory-level = 2 (e.g. multisite, rural AND urban) • Captured estimates for a rural and urban sample = 1 (e.g. multisite, rural OR urban) • Captures estimates for only a rural or urban sample = 0 (e.g. single site, rural OR urban)
2) Was the sampling frame a true or close representation of the target population? • Yes = 1 • No = 0
3) Was some form of random selection used to select the sample, OR was a census undertaken? • Yes = 1 • No = 0
4) Was the likelihood of non-response bias minimal? • 80% or higher = 1 (e.g. ≥80% response / participation rate; ≤20% loss to follow-up, etc.) • 79% or lower = 0 (e.g. ≤80% response / participation rate; ≥20% loss to follow-up, etc.)
INTERNAL VALIDITY

5) Were data collected directly from the subjects (as opposed to a proxy)?

- Directly = 1
- Proxy = 0

6) Was an acceptable case definition used in the study?

- Yes = 1 (e.g. wound type(s) were defined, or classified using a standardised tool)
- No = 0 (e.g. wound type(s) were not defined or classified)

7) Was the outcome of interest measured or assessed using a reliable and valid tool and / or standard diagnostic criteria?

- Yes = 1
- No = 0

8) Was the same mode of data collection used for all subjects?

- Yes = 1
- No = 0

9) Were the numerator(s) and denominator(s) for the parameter(s) of interest appropriate?

- Yes = 1
- No = 0

The total quality score for each study is the sum of the scores for individual assessment items. This is converted to a proportional quality score (the total quality score divided by the maximum score possible) and expressed as a percentage.

Data extraction and quality assessment is completed independently (SR and LM). Results are reviewed and where disagreement occurs results are discussed with RP to reach consensus.

Supplementary Material 3 (S3)

Summary of Study Characteristics

First author (reference)	Year	State	Setting	Study type and length	Sample	Sample size	Quality score	Parameters and findings
Studies of arterial ulcers (AU)								
Baker (28)	1992	WA	Fremantle Hospital, Perth	Prospective cross-sectional Study period = 3 months	All people: (1) referred and presenting to a specialist wound clinic with leg ulcer(s) of ≥1 month duration in the study period, and (2) who were fully assessed (93% of sample)	242	70%	Arterial disease was found in: - 45/239 limbs with ulcers (18.8%) – mixed cause - 21/239 limbs with ulcers (8.8%) – primary cause - 35/47 feet with ulcers (74.5%) – mixed / primary cause - 60/208 fully-investigated people (28.8%)
Carville (29)	1998	WA	Silver Chain home care service area	Prospective cross-sectional Study period = 7 days	All people attending a community nursing service, with a current wound and wound care plan, in the study week	Not specified	60%	- 817 people had LUs (48.2% of all wounds) - Of these, 78/817 (9.5%) had an AU

Carville (30)	2004	WA	Silver Chain home care service area	Prospective cohort Study period = approx. 5 months	All people presenting to the service with any type of wound (chronic or otherwise); clients were veterans.	155	60%	- 47.0% of people presented with a LU - 18.0% (*n* = 19) of these LUs were AUs
Edwards (9)	2013	QLD	Community specialist wound clinic and hospital outpatient wound clinic	Retrospective cross-sectional survey Study period = 1 year Prospective longitudinal Study period = 6 months	All people attending one of the participating clinics with a non-malignant ulcer below the knee	Retrospec. = 104 Prospec. = 70	60%	Of the people with LUs included in the study: - 6/70 people had an AU (8.6%) - 1/6 people had signs of AU infection (16.7%) [This paper also reported median time to healing, but in a graph which could not be accurately read.]
Hoskins (31)	1997	NSW	Various public and private community healthcare providers	Prospective cohort Study period = 3 months	All people presenting to one of the participating community healthcare providers with a leg ulcer	330	60%	Of the people with LUs included in this study: - 10.0% had an AU (*n* = 33)

Jopp-McKay (32)	1991	WA	Leg ulcer clinic, Fremantle Hospital, Perth	Prospective cohort Study period = 1 year	All people referred to the clinic in the study period	116	50%	Of the people with LUs included in the study: - 4/135 ulcerated limbs (3.0%) had an AU – primary cause - 23/135 ulcerated limbs (17.0 %) had an AU – mixed cause
Liew (33)	1998	TAS	Leg ulcer clinic, Repatriation Hospital, Hobart	Prospective cohort Study period = 40 months	All people attending the leg ulcer clinic	345	50%	Of the people with LUs included in the study, 19.0% (*n* = 61) had an AU
Muller (34)	1999	QLD	Royal Brisbane Hospital ulcer clinic	Prospective cohort Study period = 1 year	All people presenting to the service	112	40%	Of the people with LUs included in the study: - 4.5% (*n* = 5) had an AU – primary cause - 9.8% (*n* = 11) had an AU – mixed cause
Rayner (36)	2007	WA	Nurse-led rural community wound clinic, Bunbury	Prospective cross-sectional Study period = 1 year	All people presenting to the clinic with a wound (chronic or otherwise)	53	40%	Of the 53 people with 64 wounds in in the study: - 10.9% (*n* = 7) of wounds were an AU - 33.3% (*n* = 6) of AUs healed in ≤12 months

Santamaria (35)	2004	WA	Clinics in the Kimberley region	Prospective randomised controlled trial Study period = 1 year	All people: (1) presenting to the service, and (2) with a chronic lower extremity ulcer	Total = 93 Study = 50 Control = 43	80%	Of the people included in the study: - 3/93 (3.2%) had an AU – primary cause - 1.0% in the intervention group had an AU - 2.0% in the control group had an AU
Walker (37)	2014	VIC	Gippsland region	Retrospective cross-sectional Study period = 2 years	All people with any wound (chronic or otherwise) documented in the Mobile Wound Care database	1762	60%	Of the people included in the study: - 24/2356 (1.0%) wounds were AU – primary cause - Median time to healing = 107.0 days

First author (reference)	Year	State	Setting	Study type and length	Sample	Sample size	Quality score	Parameters and findings
Studies of diabetic foot ulcers (DFU)								
Baba (38)	2014	WA	Fremantle region	Prospective cohort Study period = 3 years 3 month	All people with diabetes mellitus presenting to pre-defined health care services	2258	80%	Of the people with diabetes mellitus in this study: - 1.2% had a DFU - In people with DFUs, incidence of first-time hospitalisation was 6.2%; 54.4% of these people were admitted with the DFU as the primary problem - The incidence of first-ever hospital admission for DFU was 5.21 per 1000 patient-years; 6.01 per 1000 patient-years in men and 4.53 per 1000 patient-years in women
Baba (39)	2015	WA	Fremantle region	Prospective cohort Study period = 3 years 3 month	All people with diabetes mellitus presenting to pre-defined health care services	2258	80%	Of the people with diabetes mellitus in this study: - 1.2% to 1.5% had a DFU - 0.5% to 1.8% had been hospitalised for DFU prior to the beginning of the study

Baker (28)	1992	WA	Fremantle Hospital, Perth	Prospective cross-sectional Study period = 3 months	All people: (1) referred and presenting to a specialist wound clinic with leg ulcer(s) of ≥1 month duration in the study period, and (2) who were fully assessed (93% of sample)	242	70%	Diabetes mellitus was found in: - 29/239 limbs with ulcers (12.1%) – mixed cause - 6/239 limb with ulcers (2.5%) – primary cause - 23/47 feet with ulcers (48.9%) – mixed or primary cause - 28/208 fully-investigated people (13.5%)
Clarke (40)	2008	WA	Hospital and primary healthcare services state-wide	Retrospective longitudinal Study period = 10 years	All people with diabetes mellitus	70 340	70%	A DFU was recorded in: - 703/70 340 (1.0%) of people in their first year of diabetes mellitus - 1730/70 340 (2.5%) of people throughout their history of diabetes mellitus

Commons (95)	2015	NT	Royal Darwin Hospital, Darwin	Prospective cross-sectional Study period = 15 months	All people admitted as inpatients with a diabetic foot infection	177	60%	- Hospital admission for an infected DFU occurred in 177 people = incidence of 79 admissions per 100 000 person years Of the people admitted with an infected DFU: - 54 (30.5%) of people had ≥1 minor amputation - 14/54 (26.0%) with 1 minor amputation required a second minor amputation - 10/54 (18.5%) with 1 minor amputation required a second major amputation - 17 (9.6%) of people had ≥1 major amputation - The median duration of hospital stay = 29.0 days
Davis (97)	2006	WA	Fremantle region	Prospective cohort Study period = 3 years 3 month	All people with diabetes mellitus presenting to pre-defined health care services	2258	80%	- DFU was a significant independent predictor of first-ever lower-extremity amputation in people with diabetes mellitus (hazard ratio [95% CI]: 5.56 [1.24-25.01])

Edwards (9)	2013	QLD	Community specialist wound clinic and hospital outpatient wound clinic	Retrospective cross-sectional survey Study period = 1 year Prospective longitudinal Study period = 6 months	All people with a non-malignant ulcer below the knee	Retrospec. = 104 Prospec. = 70	60%	Of the people with LUs included in the study: - 6/70 (8.6%) people had a DFU - 1/6 (16.7%) people had signs of DFU infection [This paper also reported median time to healing, but in a graph which could not be accurately read.]
Ewald (98)	2001	NT	Regional hospitals in Alice Springs and Tennant Creek	Retrospective cohort Study period = 7 years	All people with diabetes mellitus presenting to the two participating hospitals, who underwent a 'separation' (amputation) in the study period	3520	60%	Of the people with diabetes mellitus in this study: - 7.0% had an amputation (minor or major), of which 34.0% were a direct result of DFUs

Haji Zaine (92)	2014	NSW	Western Sydney	Retrospective cohort Study period = 1 year	All people with diabetes mellitus and a DFU	195	70%	Of 195 people with DFUs: - 7/195 (3.6%) people had recurrent DFU(s) - 97/195 (49.7%) had signs of DFU infection - 1/195 (0.5%) had a major amputation - 4/195 (2.1%) had a minor amputation
Jopp-McKay (32)	1991	WA	Leg ulcer clinic, Fremantle Hospital, Perth	Prospective cohort Study period = 1 year	All people referred to the clinic in the study period	116	50%	Of the people with LUs included in the study: - 5/135 ulcerated limbs (3.7%) had a DFU – primary cause - 22/135 ulcerated limbs (16.3%) had a DFU – mixed cause
Lazzarini (42)	2013	QLD	State-wide	Prospective cohort Study period = 1 year	All people: (1) with a foot ulcer, and (2) registered with a Queensland High Risk Foot	2034	70%	- 2034 people presented with a foot ulcer; of these, 85.0% had a diagnosis of diabetes mellitus - Median time to ulcer healing was 6.0 weeks - 37.0% of people experience ulcer recurrence
Lim (99)	2006	WA	Department of Vascular Surgery, Royal Perth Hospital, Perth	Retrospective cross-sectional Study period = 2 years	All people who underwent major lower limb amputation	87	50%	The most common cause of major lower-limb amputation were: - Diabetic foot infection (15/87 = 17.2%); diabetes was present in 43/87 (49.4%) of people receiving a major lower-limb amputation

McGill (88)	2005	NSW	Diabetes Centre, Royal Prince Albert Hospital, Sydney	Prospective case-control Study period = 2.5 years	All people: (1) aged <65 years at baseline, with (2) diabetes mellitus, (3) neuropathy *or* no neuropathy, and (4) no active foot lesion	2700	60%	Of the people included in the study: - 6 people with diabetic neuropathy developed a DFU (34 ulcers); annual incidence 6.3% - 3 people without diabetic neuropathy developed a DFU (3 ulcers); annual incidence 0.5%
Muller (34)	1999	QLD	Royal Brisbane Hospital ulcer clinic	Prospective cohort Study period = 1 year	All people presenting to the service	112	40%	Of the people included in the study: - 9.0% (*n* = 10) had a DFU - 5.4% (*n* = 6) of these ulcers were neuropathic - 3.6% (*n* = 4) of these ulcers were neuro-ischaemic
O'Rourke (96)	2002	NT	High Risk Foot Service, Royal Darwin Hospital, Darwin	Prospective cross-sectional Study period = 3 years	All people presenting to the service, as inpatients or outpatients	126	80%	Of the people with DFUs included in the study: - 46/126 (36.5%) had a minor amputation - 29/126 (23.0%) had a major amputation

Perrin (41)	2006	VIC	Diabetic Foot Clinic, Bendigo Hospital, Bendigo	Retrospective cross-sectional Study period = 2 years	All people: (1) presenting to the clinic, and (2) whose medical histories were examined (79% of total people presenting)	181	50%	Of the people included in the study: - 59/181 (32.6%) had a DFU; 123 wounds in total - 18/123 (14.6%) of DFUs showed signs of infection - There were 13 amputations - The mean time to healing was 15.7 weeks - 47.0% of DFUs healed in 12 weeks - 72.0% of DFUs healed in 20 weeks
Perrin (87)	2011	VIC	Not specified	Prospective cohort Study period = not specified	All people recruited into the study	121	30%	In the study period 34.2% of people developed a new DFU.
Perrin (86)	2012	VIC	Community and hospital podiatry service, Bendigo	Prospective cross-sectional Study period = 3 months	All people: (1) presenting to the service, and (2) with diabetes mellitus	576	80%	- Of the people included in this study 36/576 (6.3%) developed a new DFU during the study period

Rodrigues (22)	2016	QLD	High Risk Foot Clinic, Townsville Hospital, Townsville	Retrospective case-control Study period = 3 years	All people: (1) presenting to the service, with (2) diabetes mellitus, and (3) a DFU	129	40%	Of the people with DFUs included in the study: - 44/129 (34.1%) received an amputation - 35/129 (27.1%) required a minor amputation - 9/129 (7.0%) required a major amputation
Santamaria (35)	2004	WA	Clinics in the Kimberley region	Prospective randomised controlled trial Study period = 1 year	All people: (1) presenting to the service, and (2) with a chronic lower extremity ulcer	Total = 93 Study = 50 Control = 43	80%	Of the people included in the study: - 36/93 (38.7%) had a DFU - 27.0% in the intervention group had a DFU - 12.0% in the control group had a DFU
Santamaria (100)	2012	VIC	Diabetic Foot Unit, Royal Melbourne Hospital, Melbourne	Prospective cohort Study period = 2 years	All people treated for DFUs	95	50%	Of the people with DFUs included in the study (228 wounds in total): - 74.8% had all wounds healed ≤ 28 days - 8.4% had all wounds healed ≥ 28 days

Tapp (89)	2003	Australia	Nationwide	Retrospective cross-sectional Study period = 2 years	A random sample of adults from the Obesity and Lifestyle Study, with and without diabetes mellitus	2476	70%	- Of the people included in the study, 19.6% were considered to be 'at risk' of developing a DFU
Walker (37)	2014	VIC	Gippsland region	Retrospective cross-sectional Study period = 2 years	All people with chronic wounds documented in the Mobile Wound Care database	1762	60%	Of the people included in the study: - 61/2356 (2.6%) wounds were DFU / neuropathic - Median time to healing = 66.3 days

First author (reference)	Year	State	Setting	Study type and length	Sample	Sample size	Quality score	Parameters and findings
Studies of venous leg ulcers (VLU)								
Baker (21)	1991	WA	Vascular Laboratory, Fremantle Hospital, Perth	Prospective cross-sectional Study period = 3 months	All people: (1) referred and presenting to a specialist wound clinic with leg ulcer(s) of ≥1 month duration in the study period, and (2) who were fully assessed (93% of sample)	242	70%	Of the people with LUs included in the study: - 57.0% had venous disease; prevalence = 0.62/1000 - In people ≥60 years, prevalence = 3.3/1000 - 76.0% of people with a VLU had a previous VLU

Baker (28)	1992	WA	Fremantle Hospital, Perth	Prospective cross-sectional Study period = 3 months	All people: (1) referred and presenting to a specialist wound clinic with leg ulcer(s) of ≥1 month duration in the study period, and (2) who were fully assessed (93% of sample)	242	70%	Venous disease was found in: - 58/239 limbs with ulcers (24.3%) – mixed cause - 102/239 limbs with ulcers (42.7%) – primary cause - 3/47 feet with ulcers (6.4%) – mixed or primary cause - 136/208 fully-investigated people (65.4%)
Carville (29)	1998	WA	Silver Chain home care service area	Prospective cross-sectional Study period = 7 days	All people attending a community nursing service, with a current wound and wound care plan, in the study week	Not specified	70%	- 817 people had LUs (48.2% of all wounds) - Of these, 233/817 (28.5%) were VLUs
Carville (30)	2004	WA	Silver Chain home care service area	Prospective cohort Study period = approx. 5 months	All people presenting to the service with a wound; clients were veterans.	155	60%	- 47.0% of people presented with a LU - 36.0% (*n* = 38) of these LUs were VLUs
Charles (43)	2014	NSW	General practitioners (GPs) participating in BEACH study	Prospective longitudinal Study period = 1 year	All people presenting to a GP participating in the BEACH study; defined LUs as per the International *Classification of Primary Care* (ICPC-2)	Not specified	50%	Prevalence of skin ulcers (general) = 7 per 1000 patient encounters (0.07%), of which VLUs represented 8.0%

Edwards (93)	2005	QLD	St Luke's Nursing Service, Brisbane / Gold Coast	Prospective randomised controlled trial Study period = 3 months	All people with: (1) an existing VLU, and (2) an Ankle Brachial Pressure Index (ABPI) of >0.8 and <1.3	Total = 33 Study = 16 Control = 17	70%	Of the people with VLUs included in the study: - 73.0% had a history of previous VLU - Healing at 12 weeks: 7/16 = 43.6% in intervention group; 4/17 = 23.5% in control group *(difference not statistically significant)* - Infection: 1/16 = 6.3% in the intervention group; 1/17 = 5.9% in the control group
Edwards (101)	2005	QLD	St Luke's Nursing Service, Brisbane / Gold Coast	Prospective randomised controlled trial Study period = 3 months	All people with: (1) an existing VLU, and (2) an Ankle Brachial Pressure Index (ABPI) of >0.8 and <1.3	Total = 56 Study = 28 Control = 28	70%	Of the people with VLUs included in the study: - Healing at 12 weeks: 46.2% in intervention group; 25.9% in control group group *(difference not statistically significant)*

Edwards (104)	2009	QLD	Spiritus (formerly St Luke's) Nursing Service, Brisbane / Gold Coast	Prospective randomised controlled trial Study period = 6 months	All people with: (1) an existing VLU, and (2) an Ankle Brachial Pressure Index (ABPI) of >0.8 and <1.3	Total = 67 Study = 34 Control = 33	60%	Of the people with VLUs included in the study: - Healing at 24 weeks: 15/26 = 57.6% in intervention group; 10/26 = 38.5% in control group *(difference not statistically significant)*
Edwards (9)	2013	QLD	Community specialist wound clinic and hospital outpatient wound clinic	Retrospective cross-sectional survey Study period = 1 year Prospective longitudinal Study period = 6 months	All people attending one of the participating clinics with a non-malignant ulcer below the knee	Retrospec. = 104 Prospec. = 70	60%	Of the people with LUs included in the study: - 32/70 (45.7%) people had a VLU - 4/32 (12.5%) people had signs of VLU infection - 20/32 (62.5%) of VLUs healed in <12 weeks with treatment in a specialist wound clinic - Recurrence at 3 mths after healing = 1/18 (5.6%) - Recurrence at 12 mths after healing = 3/18 (16.7%) - Median time to recurrence = 63 weeks [This paper also reported median time to healing, but in a graph which could not be accurately read.]

Finlayson (109)	2009	QLD	Community- and hospital-based leg ulcer clinics	Cross-sectional survey plus chart review Study period = 2 years	All people attending one of the participating clinics with a VLU, completely healed for ≥2 weeks	122	70%	Of the people with VLUs included in this study: - 36.0% (*n* = 44) experienced recurrence ≤3 months - An additional 20.0% (*n* = 22) experienced recurrence in 12 months
Finlayson (106)	2014	QLD	Community- and hospital-based leg ulcer clinics	Randomised controlled trial Study period = 3 years	All people attending one of the participating clinics: (1) with a VLU of ≥1cm^2, and (2) with an Ankle Brachial Pressure Index (ABPI) of >0.8 and <1.3	103	80%	Of the people with VLUs included in this study: - 84.0% who received a four-layer compression system healed in ≤24 weeks; mean percentage of reduction in VLU size = 96.0% - 72.0% who received a three-layer compression system healed in ≤24 weeks; mean percentage of reduction in VLU size = 93.0%
Hoskins (31)	1997	NSW	Various public and private community healthcare providers	Prospective cohort Study period = 3 months	All people presenting to one of the participating community healthcare providers with a leg ulcer	330	60%	Of the people with LUs included in this study: - 27.6% had a VLU (*n* = 91)

Jopp-McKay (32)	1991	WA	Leg ulcer clinic, Fremantle Hospital, Perth	Prospective cohort Study period = 1 year	All people referred to the clinic in the study period	116	50%	Of the people with LUs included in the study: - 57/135 ulcerated limbs (42.2%) had a VLU – primary cause - 26/135 ulcerated limbs (19.3%) had a VLU – mixed cause - 42/57 (73.6%) of limbs with VLUs healed in 6 months - 3/50 patients (6.0%) with VLUs required hospitalisation
Kapp (94)	2013	VIC	Home nursing service, 16 geographic areas in Victoria	Prospective randomised controlled trial Study period = 26 weeks	All people: (1) within 1 week of complete healing of all VLUs, and (2) with an Ankle Brachial Pressure Index (ABPI) of >0.8 and <1.2	93	70%	Of the people with VLUs included in the study: - 81.7% had a previous VLU - 11/93 (11.8%) had a recurrence of the study VLU; average time to recurrence = 77.9 days - Smaller number (not specified) had a recurrence of an older VLU - 58.1% had a VLU infection prior to the study
Liew (33)	1998	TAS	Leg ulcer clinic, Repatriation Hospital, Hobart	Prospective cohort Study period = 40 months	All people attending the leg ulcer clinic	345	50%	Of the people with LUs included in the study, 59.0% (*n* = 193) had a VLU

Muller (34)	1999	QLD	Royal Brisbane Hospital ulcer clinic	Prospective cohort Study period = 1 year	All people presenting to the service	112	40%	Of the people included in the study: - 70.5% (*n* = 79) had a VLU – primary cause - 9.8% (*n* = 11) had a VLU – mixed cause
O'Brien (102)	2013	QLD	Royal Brisbane Hospital outpatients' clinic	Randomised controlled trail Study period = 3 months	All people presenting to the service with a VLU	11 Study = 6 Control = 5	60%	Of the people with a VLU included in the study: - 50.0% in the intervention group healed in ≤12 weeks; average reduction in ulcer size = 77.0% - 40.0% in the usual care group healed in ≤12 weeks; average reduction in ulcer size = 45.0%
Parker (105)	2014	QLD	Community leg ulcer clinic, Brisbane	Prospective cohort and retrospective chart review Study period = 24 weeks	All people presenting to the clinic with a wound	119	50%	Of the people participating in this study: - 96.8% (*n* = 61) classified as 'low risk' had a VLU which healed in ≤24 weeks - 75.0% (*n* = 6) classified as 'high risk' had a VLU which did not heal in ≤24 weeks
Rayner (36)	2007	WA	Nurse-led rural community wound clinic, Bunbury	Prospective cross-sectional Study period = 1 year	All people presenting to the clinic with a wound	53	40%	Of the 53 people with 64 wounds in in the study: - 53.1% (*n* = 34) of wounds were a VLU - 67.7% (*n* = 21) of VLUs healed in ≤12 months

Santamaria (35)	2004	WA	Clinics in the Kimberley region	Prospective randomised controlled trial Study period = 1 year	All people: (1) presenting to the service, and (2) with a chronic lower extremity ulcer	Total = 93 Study = 50 Control = 43	80%	Of the people included in the study: - 8/93 (8.6%) had a VLU – primary cause - 7.5% in the intervention group had a VLU - 1.0% in the control group had a VLU
Smith (108)	2010	VIC	Not applicable	Prospective cohort Study period = 2 months	All people with a chronic VLU (≥6 weeks duration), with the cognitive / literacy skills necessary to complete a wound logbook	14	50%	Of the people included in the study: - 50.0% (*n* = 7) – "half" – had a recurrent VLU - Wound area decreased by an average of 43.0% in the study period

Stacey (107)	1997	WA	Freemantle Hospital leg ulcer clinic	Randomised controlled trial Study period = 9 months	All people: (1) presenting to the service, and (2) with a chronic VLU	113	60%	Healing of VLUs: - Dressing 1: 86.0% (37/43) people healed in ≤9 months; mean rate of reduction in wound size = 0.83cm^2 per week - Dressing 2: 65.9% (29/44) people healed in ≤9 months; mean rate of reduction in wound size = 0.53cm^2 per week - Dressing 3: 58.7% (27/46) people healed in ≤9 months; mean rate of reduction in wound size = 0.02cm^2 per week
Walker (37)	2014	VIC	Gippsland region	Retrospective cross-sectional Study period = 2 years	All people with chronic wounds documented in the Mobile Wound Care database	1762	60%	Of the people included in the study: - 73/2356 (3.1%) wounds were VLU – primary cause - Median time to healing = 63.9 days

Weller (103)	2012	QLD, VIC	Four specialised metropolitan wound clinics	Prospective randomised controlled trial Study period = 2 years	All people: (1) who were ambulant, (2) had a VLU present for ≥4 weeks with an area of ≥1cm^2 to ≤20cm^2, (3) and with an Ankle Brachial Pressure Index (ABPI) of >0.8 and <1.2	Total = 45 Study = 23 Control = 22	70%	Of the people with VLUs included in the study: - 27/45 (60.0%) healed in the 12 week study period - 17/23 (73.9%) of ulcers in the study group healed - 10/22 (45.1%) ulcers in the control group healed - 6/26 (23.1%) of ulcers recurred; all recurrences occurred within 5 weeks of healing

First author (reference)	Year	State	Setting	Study type and length	Sample	Sample size	Quality score	Parameters and findings
Studies of pressure injuries (PI)								
Asimus (53)	2011	NSW	Hunter New England region	Point prevalence survey Study period = points in 2009, 2009 and 2010	All people admitted to healthcare facilities in the study region	2008 = 1407 2009 = 1279 2010 = 1331	50%	- In 2008, prevalence of PIs = 29.4% (884 PIs) - In 2008, prevalence of hospital-acquired PIs = 23.4% Following a PI prevention program: - In 2009, prevalence of PIs = 23.8% (611 PIs) - In 2009, prevalence of hospital-acquired PIs = 17.2% - In 2010, prevalence of PIs = 13.0% (344 PIs) - In 2010, prevalence of hospital-acquired PIs = 8.0% - Total number of Stage III/IV PIs decreased from 14.9% (2009) to 13.9% (2010)

Bail (68)	2013	NSW	Hospitals state-wide	Retrospective cohort Study period = 2 years	All people aged ≥50 years admitted to a hospital for any reason and subsequently discharged	426 276	70%	Incidence of PIs: - In people in hospital aged >50 – medical = 4.2% - In people in hospital aged >50 – surgical = 4.9% - In people without dementia – medical = 3.8% - In people without dementia – surgical = 4.1% - In people with dementia – medical = 5.9% - In people with dementia – surgical = 7.3%
Banks (75)	2010	QLD	Multiple acute and residential aged care facilities in Brisbane	Prospective cohort Study period = 1 timepoint (T1), then another timepoint (T2) 1 year later	All people admitted to a participating facility on the day of the study	3047	80%	In the people living in residential aged care facilities in the study who were determined to be malnourished: - Prevalence of PI = 31.5% at T1 - Prevalence of PI = 18.3% at T2 - PU prevention guidelines were implemented between T1 and T2

Banks (25)	2016	QLD	Royal Brisbane & Women's Hospital, Herston	Prospective randomised controlled trial Study period = 8 months	All people with an existing Stage II to IV PI	50	60%	With an intensive nutrition intervention, 18/31 (58.1%) of people had PI healed within their hospital admission (average 14 days, range 1 to 70 days).

Barker (54)	2013	VIC	Northern Hospital, Melbourne	Prospective randomised controlled trial Study period = points in 2003, 2004, 2006, 2007 and 2011	All people admitted to the hospital, in general wards, critical care and emergency departments	1045 2003 = 151 2004 = 201 2006 = 201 2007 = 219 2011 = 273	60%	Prevalence of PIs on admission to hospital: - 2003 = 9/151 (6.0%) - 2004 = 8/201(4.0%) - 2006 = 7/201 (3.5%) - 2007 = 5/219 (2.3%) - 2011 = 11/273 (4.0%) Prevalence of hospital-acquired PIs: - 2003 = 19/151 (12.6%) - 2004 = 23/201(11.5%) - 2006 = 16/201 (8.0%) - 2007 = 10/219 (4.6%) - 2011 = 7/273 (2.6%) Overall prevalence of PIs (on admission + hospital-acquired): - 2003 = 28/151 (18.5%) - 2004 = 31/201(15.4% - 2006 = 23/201 (11.4%) - 2007 = 15/219 (6.5%) - 2011 = 18/273 (6.6%)

Carville (30)	2004	WA	Silver Chain home care service area	Prospective cohort Study period = approx. 5 months	All people presenting to the service with a wound; clients were veterans.	155	60%	- 47.0% of people presented with a wound - 6.0% (*n* = 9) of these wounds were PIs
Charles (43)	2014	NSW	General practitioners (GPs) participating in BEACH study	Prospective longitudinal Study period = 1 year	All people presenting to a GP participating in the BEACH study; defined LUs as per the International *Classification of Primary Care* (ICPC-2)	Not specified	50%	Prevalence of skin ulcers (general) = 7 per 1000 patient encounters (0.07%), of which PIs represented 5.0%
Charlier (55)	2001	NSW	Rural hospital	Prospective cross-sectional and longitudinal Study period = daily assessment for a maximum of 7 days	All people admitted to the hospital	Point prev.= 59 Incidence= 62	80%	Of the people included in this study: - 7/59 (11.8%) had PI(s); 4/59 (6.8%) had ≥2 PIs In the study period of 7 days: - 5 PIs developed in 4/62 people = incidence of 6.5% across PI Stages I-IV - 1/62 people had a PI of ≥Stage II (Stage II) = incidence of 2.0% across PI Stages II, III and IV

Clinical Excellence Commission (26)	2017	NSW	16 NSW Department of Health Facilities	Prospective cross-sectional Study period = point prevalence, 2 points (2015, 2016)	All people admitted to the participating facilities on the day of study, who consented to a skin inspection	10 255	70%	Prevalence of PIs: - Overall = 9.1% (6.1% hospital-acquired in 2015; 5.3% hospital-acquired in 2016) - In residential aged care clients = 10.3% - In community and outpatient clients = 7.7% - 44% of all PIs were Stage I
Coyer (76)	2014	QLD	Metropolitan hospital, East Coast	Prospective cross-sectional repeated measures Study period = 1 day per month for 6 months	All people admitted to the hospital on the days of study	132	40%	- Community-acquired PIs = 4/132 (3.0%) - Hospital-acquired PIs = 17/132 (12.9%) - Medical device-related PIs (included in the count of hospital-acquired PIs) = 8/132 (6.1%)
Coyer (24)	2016	QLD	All Queensland Health hospitals	Retrospective longitudinal Study period = 2 years	Data from Queensland bedside audits including all people admitted to hospital with PIs of Stages II, III and IV	7291	70%	- Prevalence of hospital-acquired PIs = 3.4% (*n* = 7291) - Prevalence of PIs in ICU patients = 11.5% - Prevalence of Stage II PIs in ICU patients = 53.1% - Prevalence of PIs in non-ICU patients = 3.0% - Prevalence of Stage II PIs in non-ICU patients = 63.5%

Coyer (78)	2015	QLD	Royal Brisbane and Women's Hospital, Herston	Prospective cohort Study period = 12 months	All people admitted to an intensive care unit for ≥24 hours	207 Case = 105 Control = 102	60%	- In the intervention group, 18.1% (19/105) people developed a PI; 4/105 had a Stage II to IV PI - In the control group, 30.4% (31/102) people developed a PI; 17/102 had a Stage II to IV PI
Cubit (79)	2013	ACT	Calvary Hospital, Bruce	Prospective case-control Study period = 2 months	All people ≥65 years and matched hospital files	109 Case = 51 Control = 58	80%	Of the people included in this study: - 1/51 (2.0%) developed a PI in the case group - 6/58 (10.3%) developed a PI in the control group - All PIs were Stage I or Stage II
Davenport (56)	1999	VIC	Knox Private Hospital	Prospective cross-sectional Study period = point prevalence	All consenting people admitted to the participating hospital on the day of the study	Survey 1 = 88 Survey 2 = 104	40%	Survey 1: - Prevalence of PIs = 13.6% of people had a Stage II or greater PI Survey 2 (following a quality improvement activity): - Prevalence of PIs = 3.0% of people had a Stage II or greater PI

Ellis (71)	2006	Unspecified	23 nursing homes	Prospective cohort Study period = not specified	All people in the participating nursing homes	Not specified	80%	Prevalence of PIs: - Pre-intervention = 25.8% - Post-intervention = 16.6%
Elliott (70)	2008	NSW	Royal North Shore Hospital, Sydney	Quasi-experimental practice improvement Study period = 2 years	All people admitted to the participating hospital, in its intensive care unit, and consenting to a skin examination	563	60%	Prevalence of PIs: - 2003: 50.0% - 2005: 8.0% (after quality improvement project – for example: the use of pressure-relieving devices)
Gardner (63)	2009	VIC	All three acute campuses of Cabrini Health Services	Prospective cross-sectional Study period = point prevalence	All people, excluding newborns, admitted to the healthcare services on the day of the study	252	60%	Of the people included in this study: - Prevalence of PIs = 71/252 (28.2%) - Excluding Stage I PIs, prevalence = 9.9% - Stage I = 145/182 (79.7%); Stage II = 26/182 (14.3%); Stage III = 1/182 (0.5%); Stage IV = 10/182 (5.5%)
Graves (48)	2005	QLD	Princess Alexandra Hospital, Woolloongabba	Prospective cross-sectional Study period = 3 months	A random sample of people admitted to the hospital	1747	40%	Of the people included in this study, 81/1747 (4.6%) had a PI.

Hunter (57)	2014	QLD	Bundaberg / Wide Bay region	Retrospective cross-sectional Study period = 3 years	Data from the PRIME clinical incidents database	Not known	50%	Prevalence of PIs in study hospital / state (note: a PI prevention programme was implemented in the study hospital in 2011): - 2007 = 10.2% / - - 2008 – 13.6% / 12.0% - 2010 = 15.6% / 10.2% - 2011 (Jan) = 15.4% / - - 2011 (Oct) = 3.2% / 7.9% - 2012 = 4.3% / 7.0% - 2013 = 3.6% / 6.0%
Jackson (49)	2011	VIC, QLD	Hospitals state-wide	Retrospective cross-sectional Study period = 2 years (VIC = 2005/06, QLD = 2006/07)	All people admitted to a participating hospital, captured by a data-flag system for hospital-acquired conditions	1 699 997	60%	Prevalence of PIs = 2873 / 1 699 997 (0.2%)

Jolley (83)	2004	VIC	Royal Melbourne Hospital	Randomised controlled trial Study period = 6 months	All people: (1) admitted to the participating hospital, (2) with an expected LOS of ≥2 days, and (3) assessed on admission to be at 'low' to 'moderate risk' of developing a PI	441 Study = 218 Control = 223	50%	Of the people included in this study: - 9.6% (*n* = 21) in the intervention group, who were treated with Australian Medical Sheepskin, developed a PI - 16.6% (*n* = 37) in the control group, who received care as usual, developed a PI
Lakhan (77)	2011	QLD	Three acute hospitals, Brisbane	Prospective cohort Study period = 3 years	All people aged ≥70 years admitted to a general medical ward for ≥24 hours	577	50%	Prevalence of PIs: - Premorbid = 9/576 (1.6%) - At admission = 28/577 (4.9%) - At discharge = 33/575 (5.7%)

Lapsley (69)	1996	NSW	One acute hospital in Sydney	Prospective cohort Study period = 3 years	All people admitted to hospital for a coronary artery bypass or orthopaedic hip replacement	3062	60%	Of the people included in this study undergoing a coronary artery bypass graft: - 3.8% (*n* = 27, 1990), 1.6% (*n* = 12, 1991) and 2.9% (*n* = 24, 1992) developed a PI - Most PIs were Grade I (77.7%, 1990; 75.0%, 1991; 58.3%, 1992) - Mean LOS for people with a PI was 22.4 days (versus 12.7 days for all patients) Of the people included in this study undergoing an orthopaedic hip replacement: - 10.2% (*n* = 27, 1990), 7.9% (*n* = 18, 1991) and 3.3% (*n* = 11, 1992) developed a PI - Most PIs were Grade I (63.0%, 1990; 66.7%, 1991; 72.7%, 1992) - Mean LOS for people with a PI was 31.2 days (versus 19.7 days for all patients)
Lewin (80)	2003	WA	Silver Chain home care service area	Prospective cross-sectional Study period = 1 month	Adults at high risk of developing a PI	175	70%	Of the people included in this study: - Prevalence of PIs = 74 / 175 (42.3%) - Stage I = 112/167 (67.1%); Stage II = 45/167 (27%); Stage III = 6/167 (3.6%); Stage IV = 4/167 (2.4%)

Lewin (81)	2007	WA	Silver Chain home care service area	Prospective cross-sectional Study period = point prevalence	All people using the service, at high risk of developing a PI	505	70%	Prevalence of pressure ulcers: - 2002 = 74/175 (42.2%) - Stage I = 112/167 (67%); Stage II = 45/167 (26.9%); Stage III = 6/167 (3.6%); Stage IV = 4/167 (2.4%); Stage V 0/167 (0.0%) - 2003 = 56/147 (38.1%) - Stage I = 72/108 (66.7%); Stage II = 32/108 (29.6%); Stage III = 2/108 (1.9%); Stage IV = 0/108 (0.0%); Stage V 2/108 (1.9%) - 2004 = 35/183 (19.1%) - Stage I = 25/51 (49%); Stage II = 23/51 (45.1%); Stage III = 0/51 (0.0%); Stage IV = 3/51 (5.9%); Stage V 0/51 (0.0%)
Liew (33)	1998	TAS	Leg ulcer clinic, Repatriation Hospital, Hobart	Prospective cohort Study period = 40 months	All people attending the leg ulcer clinic	345	50%	Of the people with LUs included in the study, 3.0% (*n* = 9) had PI

Madsen (73)	1997	QLD	Rockhampton	Prospective cross-sectional Study period = point prevalence	All people admitted to the participating nursing homes on the day of the study	Not specified	80%	- Prevalence rate of PIs = 0.03 (*n* = 4) - Stage I = 2, Stage II = 1, Stage 3 = 1
Martin (58)	1994	VIC	Heidelberg Repatriation Hospital	Prospective cross-sectional Study period = point prevalence	All consenting people admitted to the participating hospital on the day of the study	Not specified	70%	- Prevalence of PIs = 6.7% (24 people, 36 ulcers) - Of these PIs: Stage I = 28.0%; Stage II = 53.0%; Stage III = 11.0%; Stage IV = 8.0%
McErlean (59)	2002	SA	Repatriation General Hospital	Prospective cross-sectional Study period = point prevalence	All adults admitted to the hospital during the study period; average age = 72 years	Not specified	70%	- Prevalence of PIs = 29.6% - Incidence of PI development = 20.6% Prevalence of PIs: - 2000: Stage I = 49.1%; Stage II = 46.0%; Stage III = 5.1%; Stage IV = 0.0% - Prevention framework implemented in 2001 - 2001 (Aug): Stage I = 59.2%; Stage II = 37.3%; Stage III = 3.7%; Stage IV = 0.0% - 2001 (Dec): Stage I = 78.5%; Stage II = 21.4%; Stage III = 3.6%; Stage IV = 0.0%

McGowan (60)	1996	WA	Freemantle Hospital, Perth	Prospective cross-sectional Study period = point prevalence	All consenting people admitted to the participating hospital on the day of the study	264	70%	- Overall prevalence of PIs = 14.0% (37/264) - Overall prevalence of new hospital-acquired PIs = 33/264 = 12 per 1000 - 80.0% of all PIs were Stage I
McGowan (90)	2000	WA	Freemantle Hospital and Hollywood Hospital	Randomised controlled trial Study period = 13 weeks	All people: (1) aged ≥60 years, (2) admitted with an orthopaedic diagnosis, and (3) assessed to be at 'low' or 'moderate' risk of developing a PI	297 Study = 55 Control = 142	70%	Incidence of PIs: - In the intervention group (medical sheepskin): 9.0% (14/155) developed a PI - In the control group: 30.3% (43/142) developed a PI
McRae (91)	2014	QLD	Royal Brisbane & Women's Hospital, Herston	Prospective cohort Study period = 3 months	All people aged ≥65 years, admitted for a predicted stay of ≥72 hours to a vascular surgical or urology ward	112	40%	Of the people included in this study, 5.0% developed a PI during hospitalisation.
McRae (23)	2016	QLD	Royal Brisbane & Women's Hospital, Herston	Prospective cohort Study period = 7 months	All people aged ≥65 years, admitted for a predicted stay of ≥72 hours to a vascular surgical ward	110	50%	Of the people included in this study, 13/110 (11.8%) developed a PI.

Miles (50)	2013	QLD	Prince Charles Hospital, Brisbane	Retrospective longitudinal Study period = 1 day per year for 9 years	All people admitted to the hospital on the days of study	Not known	60%	Of the people included in this study, prevalence of hospital-acquired + community-acquired PI: - 2002: Incomplete data - 2003: Incomplete data - 2004: 34/246 (13.8%); 55 PIs total - 2005: 27/289 (9.3%); 38 PIs total - 2008: 55/356 (15.4%); 85 PIs total - 2009: 45/388 (11.6%); 69 PIs total - 2010: 21/349 (6%); 33 PIs total - 2011/i: 48/401 (12%); 63 PIs total - 2011/ii: 38/408 (9.3%); 51 PIs total - 2012: 21/327 (6.4%); 30 PIs total

Morey (64)	1997	WA	Sir Charles Gairdner Hospital, Perth	Retrospective longitudinal Study period = 1 day per year for 2 years	All people admitted to the hospital on the days of study	1994 = 454 1995 = 489	70%	Results in 1994: - 71/454 (15.6%) of people had a PI - 18/71 (14.8%) of PIs were community-acquired - Stage I = 51.6%; Stage II = 37.7%; Stage III = 5.7%; Stage IV = 4.9% - Incidence of hospital-acquired PIs = 12 per 100 - Risk of developing a PI in hospital = 7.2 people per 1000 bed days Results in 1995: - 71/489 (14.5%) of people had a PI - 38/71 (37.6%) of PIs were community-acquired - Stage I = 42.6%; Stage II = 49.5%; Stage III = 5.9%; Stage IV = 2.0% - Incidence of hospital-acquired PIs = 9.8 per 100 - Risk of developing a PI in hospital = 7.6 people per 1000 bed days

Mulligan (61)	2011	WA	Hospitals state-wide	Prospective cross-sectional Study period = point prevalence	All people admitted to the hospital on the days of study	Not known	90%	Of the people included in this study: - 2007: 10.9% had a PI; 42.4% (*n* = 213) were Stage I - 2008: 12.5% had a PI; 42.9% (*n* = 267) were Stage I - 2009: 9.5% had a PI; 38.4% (*n* = 163) were Stage I - 2011: 11.0% had a PI; 44.7% (*n* = 228) were Stage I Results from other similar studies reported in this paper: NSW: - 2008: 13.5% (from a cohort of 2813), 13.2% hospital-acquired - 2009: 11.0% (from a cohort of 1990); 9.4% hospital-acquired - 2011: 12.1% (from a cohort of 2013); 9.2% hospital-acquired QLD: - 2003: 18.0% (sample size not recorded); hospital-acquired not reported - 2009: 15.0% (from a cohort of 6371); 11.7% hospital-acquired SA: - 2007: 20.0% (from a cohort of 4298); 17.0% hospital-acquired VIC: - 2003: 26.5% (from a cohort of 6003); 18.0% hospital-acquired - 2004: 20.8% (from a cohort of 7621); 14.0% hospital-acquired - 2005: 17.6% (from a cohort of 7944); 12.0% hospital-acquired

Pearson (51)	2000	NSW	Hospitals in northern NSW	Prospective cross-sectional Study period = point prevalence	All people admitted to the hospitals on the day of the study	634	90%	Of the people included in this study: - 40/634 (6.3%) had a PI; there were a total of 69 PIs - Most (54/67 ulcers, 80.6%) had a PI of Stage I / II
Prentice (65)	2007	Multi-state	10 tertiary hospitals	Prospective cohort Study period = 8 months	All people admitted to the hospitals on the day of the study	Pre = 1706 Post = 1807	70%	Of the people included in this study: - 26.5% (*n* = 452) had a PI at pre-intervention - 63.0% (*n* = 564) were Stage I - Mean LOS = 61.1 days - 22.0% (*n* = 396) had a PI at post-intervention - 59.0% (*n* = 390) were Stage I - Mean LOS = 58.5 days

Quality and Safety Branch, Victorian Government Department of Human Services (66)	2006	VIC	All hospitals in Victoria	Prospective cross-sectional Study period = point prevalence	All people admitted to the hospitals on the days of the study	Not specified	90%	Prevalence of PIs: - 2003: 26.5% (67.6% hospital-acquired) - Stage I = 43.1% (*n* = 1153); Stage II = 44.2% (*n* = 1183); Stage III = 4.5% (*n* = 120); Stage IV = 8.2% (*n* = 220) - 2004: 20.8% (66.2% hospital-acquired) - Stage I = 37.3% (*n* = 955); Stage II = 47.8% (*n* = 1124); Stage III = 6.4% (*n* = 165); Stage IV = 8.4% (*n* = 215) - 2006: 17.6% (67.7% hospital-acquired) - Stage I = 40.4% (*n* = 848); Stage II = 47.0% (*n* = 987); Stage III = 5.9% (*n* = 123); Stage IV = 6.8% (*n* = 142)
Rayner (36)	2007	WA	Nurse-led rural community wound clinic, Bunbury	Prospective cross-sectional Study period = 1 year	All people presenting to the clinic with a wound.	53	40%	Of the 53 people with 64 wounds in in the study: - 9.4% (*n* = 6) of wounds were a PI - All PIs healed in ≤12 months

Roosen (52)	2010	QLD	Prince Charles Hospital, Brisbane	Prospective longitudinal Study period = 5 years (intermittent)	All people admitted, and captured in internal audit data	Not known	40%	Prevalence of PIs: - 2006 = 7.6% - 2008 = 13.7% (75 PIs identified, 57.0% at Stage I) - 2010 = 5.2% - Overall, 53.0% of the PIs were at Stage I
Santamaria (35)	2004	WA	Clinics in the Kimberley region	Prospective randomised controlled trial Study period = 1 year	All people: (1) presenting to the service, and (2) with a chronic lower extremity ulcer	Total = 93 Study = 50 Control = 43	80%	Of the people included in the study: - 14/93 (15.1%) had a PI - 3.0% in the intervention group had a PI - 12.0% in the control group had a PI
Santamaria (72)	2005	VIC, WA, SA, NSW	Nursing homes in various regions of the participating states	Prospective cross-sectional Study period = 3 months	All people living in the participating facilities	1956	80%	Of the people included in this study: - 122/471 (25.9%) had a PI - 205 (44.1%) had a Stage I PI; 204 (43.9%) had a Stage II PI; 26 (5.6%) had a Stage III PI; 30 (6.5%) had a Stage IV PI

Santamaria (74)	2009	WA	Hospitals and primary healthcare services state-wide	Prospective cohort Study period = 1 month in 2007; 1 month in 2008	All consenting adult, paediatric, neonatal inpatients or aged-care residents admitted in public hospitals on audit days	2007 = 2777 2008 = 3024	70%	- In 5801 people examined, prevalence of PIs = 9.0% - In 2007, prevalence of PIs = 303/2777 (10.9%) - 150 had a Stage I PI; 147 had a Stage II PI; 21 had a Stage III PI; 22 had a Stage IV PI; 16 had an uncertain staging - In 2008, prevalence of PIs = 377/3024 (12.5%) - 176 had a Stage I PI; 197 had a Stage II PI; 31 had a Stage III PI; 22 had a Stage IV PI; 20 had an uncertain staging
Walker (37)	2014	VIC	Gippsland region	Retrospective cross-sectional Study period = 2 years	All people with chronic wounds documented in the Mobile Wound Care database	1762	70%	Of the people included in the study: - 258/2356 (11.0%) wounds were PI - 68 (26.4%) were Stage I; 124 (48.1%) were Stage II; 55 were Stage III (21.3%); 11 (4.3%) were Stage IV - Median time to healing = 57.9 days - For Stage I = 45.6 days; for Stage II = 56.5 days; for Stage III = 58.9 days; for Stage IV = 58.3 days

Webster (46)	2010	QLD	Royal Brisbane & Women's Hospital, Herston	Prospective cohort Study period = 6 weeks	All people admitted to an internal medicine ward, with an expected stay of ≥72 hours	274	70%	Of the people included in this study: - 15/274 (5.5%) had an existing PI - 12/274 (4.4%) developed a new PI during admission
Webster (44)	2011	QLD	Royal Brisbane & Women's Hospital, Herston	Prospective cohort Study period = 9 months	All people admitted to an internal medicine or oncology ward, with an expected stay of ≥72 hours	820	60%	Of the people included in this study: - 5.8% (*n* = 71) had an existing PI - Stage 1 = 36.6% (*n* = 21); Stage II = 39.4% (*n* = 28); Stage III = 8.5% (*n* = 6); Stage IV = 7.0% (*n* = 5); unclassifiable = 8.5% (*n* = 6)
Webster (45)	2015	QLD	Royal Brisbane & Women's Hospital, Herston	Prospective cohort Study period = 3 months	All people booked for any surgical procedure expected to last >30 minutes	534	60%	Of the people included in this study: - 7/534 (1.3%) had a PI prior to surgery - 3 were Stage I; 2 were Stage II; 2 were un-stageable - 6/474 (1.3%) had a PI develop post-surgery - 4 were Stage I; 2 were Stage II

Wright (47)	1996	VIC	Royal Melbourne Hospital	Prospective cross-sectional Study period = point prevalence	All consenting people admitted to the hospital on the day of the study	554	80%	Of the people included in the study: - 30/554 (5.4%) had a PI - 8/30 (26.7%) had a community-acquired PI - 16/30 (53.3%) had a hospital-acquired PI - 6/30 (20.0%) of people had a PI of undetermined origin - 29/45 (64.4%) of PIs were Stage I or Stage II - 14/45 (31.1%) of PIs were Stage III - 2/45 (4.4%) of PIs were Stage IV The authors report on a previous unpublished audit at the same hospital, undertaken in 1991, where the rate of PI was 6.6%.

Young (62)	2000	TAS	Launceston General Hospital	Prospective cross-sectional Study period = point prevalence	All consenting people admitted to the hospital on the days of the study	Not specified	60%	1996: - Prevalence of PIs = 10.0% - Stage I = 50.0% (*n* = 9); Stage II = 11.0% (*n* = 2); Stage III = 23.0% (*n* = 4); Stage IV = 16.0% (*n* = 3) 1997: - Prevalence of PIs = 8.0% - Stage I = 6.0% (*n* = 1); Stage II = 13.0% (*n* = 2); Stage III = 81.0% (*n* = 13); Stage IV = 0% 1998: - Prevalence of PIs = 9.0% - Stage I = 50.0% (*n* = 7); Stage II = 36.0% (*n* = 6); Stage III = 7.0% (*n* = 1); Stage IV = 7.0% (*n* = 1) 1999: - Prevalence of PIs = 12.0% - Stage I = 33.0% (*n* = 9); Stage II = 63.0% (*n* = 17); Stage III = 4.0% (*n* = 1); Stage IV = 0% - PIs developed in study hospital = 67.0%; PIs developed in other hospitals = 11.0%; PIs developed in the community = 22.0%

Young (82)	2000	WA	A large metropolitan teaching hospital	Prospective cohort Study period = 6 weeks	All consenting people admitted to an orthopaedic surgical ward at the participating hospital	90	60%	- Incidence of PIs = 11.1% (10/90) people developed a PI in the study period - Of these PIs: Stage I = 50.0%; Stage II = 50.0%
Young (67)	2002	WA	A large metropolitan teaching hospital	Combination of 3 cross-sectional cohort studies Study period = point prevalence at 3 points in 3 different years	All people admitted to the medical and surgical wards of the participating hospital on the study days	1394	70%	Of the people included in this study: - 15.9% (*n* = 221) had a PI - 22.6% had a PI on admission - 12.7% developed a PI while in hospital - Median LOS of stay for people with PIs = 34 days, compared with 25 days for all patients - 25.0% (*n* = 20) of long-stay patients (≥91 days admission) had a PI

First author (reference)	Year	State	Setting	Study type and length	Sample	Sample size	Quality score	Parameters and findings
Studies of all leg ulcers (LUs)								

Baker (84)	1994	WA	Perth	Prospective cross-sectional Study period = point prevalence	All people presenting to a general practitioner, medical specialist, podiatrist, nursing home or community care service with a leg ulcer present for ≥1 month	Not specified	80%	- Prevalence of LUs = 1.1 per 1000 (0.1%) - Prevalence of LUs in ≥60 years = 5.9 per 1000 - 65.0% of ulcers were recurrent
Carville (29)	1998	WA	Silver Chain home care service area	Prospective cross-sectional Study period = 7 days	All people attending a community nursing service, with a current wound and wound care plan, in the study week	Not specified	70%	- 817 people had LUs (48.2% of all wounds) - Of these, 431/817 (52.7%) were 'unclassified' - Of these, 73/817 (8.9%) were 'mixed' aetiology
Charles (43)	2014	NSW	General practitioners (GPs) participating in BEACH study	Prospective longitudinal Study period = 1 year	All people presenting to a GP participating in the BEACH study; defined LUs as per the International *Classification of Primary Care* (ICPC-2)	Not specified	50%	- Prevalence of LUs = 7 per 1000 patient encounters - 59.0% of LUs occurred in people aged ≥75 years = 24 per 1000 patient encounters - LUs occurred more frequently in people in residential aged care facilities: 102 per 1000 LU encounters, versus 17 per 1000 total encounters

Hoskins (31)	1997	NSW	Various public and private community healthcare providers	Prospective cohort Study period = 3 months	All people presenting to one of the participating community healthcare providers with a leg ulcer	330	60%	- Prevalence of LUs = 0.1% - Prevalence of LUs in people aged ≥65 years = 0.6% - In 3 months, 20.3% (*n* = 67) of LUs healed - Mean duration of LUs = 9.0 years
Johnson (85)	1995	NSW	Sydney	Retrospective cohort	All non-institutionalised elderly (≥60 years) in the study catchment	1981 = 1050 1988 = 616	50%	- In 1981, prevalence of LUs = 5/1050 (0.5%) - In 1988, prevalence of LUs = 2/616 (0.3%)
Jopp-McKay (32)	1991	WA	Leg ulcer clinic, Fremantle Hospital, Perth	Prospective cohort Study period = 1 year	All people referred to the clinic	116	50%	- 38.8% of all LUs were healed at 3 months - 67.0% of all LUs were healed at 6 months - 10/135 limbs (7.4%) had LUs unhealed at 12 months - 16 people (13.8%) with LU complications were admitted to hospital
Lazzarini (27)	2016a	QLD	Five public hospitals in Queensland	Point prevalence survey Study period = 1 selected day	All people admitted to healthcare facilities during the study period	1146	90%	Of the people included in this study: - 9.8% (*n* = 72) reported having a previous foot ulcer - 6.3% (*n* = 46) were found to have a current foot ulcer

Muller (34)	1999	QLD	Royal Brisbane Hospital ulcer clinic	Prospective cohort Study period = 1 year	All people presenting to the service	112	40%	Of the people included in the study with a wound: - Those without complication(s) had an average time to healing of 4.6 weeks - Those with one or more complication(s) had an average time to healing of 23.9 weeks; 4.5% (*n* = 5) were admitted for inpatient care
Mulligan (61)	2011	WA	Hospitals state-wide	Prospective cross-sectional Study period = point prevalence	All people admitted to the hospital on the days of study	Not known	90%	Of the people included in this study: - 2007: 2.6% had a leg ulcer - 2008: 2.8% had a leg ulcer - 2009: 2.0% had a leg ulcer - 2011: 2.3% had a leg ulcer
Santamaria (35)	2004	WA	Clinics in the Kimberley region	Prospective randomised controlled trial Study period = 1 year	All people: (1) presenting to the service, and (2) with a chronic lower extremity ulcer	Total = 93 Study = 50 Control = 43	80%	- For all LUs, healing rate: control = 6.3% per week; intervention = -4.9% per week - For all LUs, amputations: control: 6/43 = 14.0%; intervention: 1/50 = 0.02%

Santamaria (74)	2009	WA	Hospitals and primary healthcare services state-wide	Prospective cohort Study period = 1 month in 2007; 1 month in 2008	All consenting adult, paediatric, neonatal inpatients or aged-care residents admitted in public hospitals on audit days	2007 = 2777 2008 = 3024	70%	- In 2007, prevalence of LUs = 71/2777 (2.6%) - In 2008, prevalence of LUs = 85/3024 (2.8%)

Supplementary Material 4 (S4)

Paper	Q1: Was the study's target population a close representation of the state/ territory population in relation to the relevant variable(s)?	Q2: Was the sampling frame a true or close representation of the target population? (e.g. every patient admitted to a hospital?)	Q3: Was some form of random selection used to select the sample, or was a census undertaken?	Q4: Was the likelihood of non-response bias minimal?	Q5: Were data collected directly from the subjects?	Q6: Was an acceptable case definition used in the study?	Q7: Was the parameter of interest measured or assessed using standard diagnostic criteria or a reliable / valid tool?	Q8: Was the same mode of data collection used for all subjects?	Q9: Were the numerators / denominators for the parameters of interest appropriate?	TOTAL
Asimus et al., 2011 (53)	2	1	0	0	1	0	0	0	1	50%
Baba et al., 2014 (38)	1	1	1	0	1	1	1	1	1	80%
Baba et al., 2015 (39)	1	1	1	0	1	1	1	1	1	80%
Bail et al., 2013 (68)	2	1	1	1	0	1	0	0	1	70%

Baker et al., 1991 (21)	1	1	0	0	1	1	1	1	1	70%
Baker et al., 1992 (28)	1	1	0	0	1	1	1	1	1	70%
Banks et al., 2010 (75)	1	1	1	0	1	1	1	1	1	80%
Banks et al., 2016 (25)	0	1	0	0	1	1	1	1	1	60%
Baker & Stacey, 1994 (84)	1	1	1	0	1	1	1	1	1	80%
Barker et al., 2013 (54)	0	1	0	0	1	1	1	1	1	60%
Carville & Lewin, 1998 (29)	1	1	1	1	1	0	0	1	1	70%
Carville & Smith, 2004 (30)	1	1	1	0	1	1	0	0	1	60%
Charles 2014 (43)	1	1	0	0	1	1	0	0	1	50%
Charlier, 2001 (55)	0	1	1	1	1	1	1	1	1	80%
Clarke et al., 2008 (40)	2	1	1	1	0	1	0	0	1	70%

Clinical Excellence Commission, 2016 (26)	2	1	1	1	1	0	0	0	1	70%
Commons et al., 2015 (95)	0	1	1	0	1	1	0	1	1	60%
Coyer et al., 2014 (76)	0	1	0	0	1	0	0	1	1	40%
Coyer et al., 2015 (78)	0	1	0	0	1	1	1	1	1	60%
Coyer et al., 2016 (24)	2	1	1	1	0	1	0	0	1	70%
Cubit et al., 2013	0	1	1	1	1	1	1	1	1	80%
Davenport, 1999 (56)	0	1	1	0	0	0	0	1	1	40%
Davis et al., 2006 (97)	1	1	1	0	1	1	1	1	1	80%
Edwards et al., 2005a (93)	0	1	1	0	1	1	1	1	1	70%
Edwards et al., 2005b (101)	0	1	1	0	1	1	1	1	1	70%
Edwards et al., 2009 (104)	0	1	1	0	1	0	1	1	1	60%

Edwards et al., 2013 (9)	0	1	0	0	1	1	1	1	1	60%
Elliott et al., 2008 (70)	0	1	0	0	1	1	1	1	1	60%
Ellis et al., 2006 (71)	1	1	1	0	1	1	1	1	1	80%
Ewald et al., 2001 (98)	0	1	1	1	0	0	1	1	1	60%
Finlayson et al., 2009 (109)	1	1	1	1	0	1	0	1	1	70%
Finlayson et al., 2014 (106)	0	1	1	1	1	1	1	1	1	80%
Gardner et al., 2009 (63)	0	1	0	0	1	1	1	1	1	60%
Graves et al., 2005 (48)	0	1	1	0	0	1	0	0	1	40%
Haji-Zaine et al., 2014 (92)	0	1	1	1	0	1	1	1	1	70%
Hunter et al., 2014 (57)	0	1	1	0	1	0	0	1	1	50%
Hoskins et al., 1997 (31)	1	1	1	0	1	0	0	1	1	60%
Jackson et al., 2011 (49)	2	1	1	1	0	0	0	0	1	60%

Johnson, 1995 (85)	1	1	0	0	1	0	0	1	1	50%
Jolley et al., 2004 (83)	0	1	1	0	1	1	1	1	1	70%
Jopp-Mckay et al., 1991 (32)	0	1	0	0	1	0	1	1	1	50%
Kapp et al., 2013 (94)	0	1	1	1	1	1	0	1	1	70%
Lakhan et al., 2011 (77)	0	1	0	0	1	1	0	1	1	50%
Lapsley et al., 1996 (69)	0	1	0	0	1	1	1	1	1	60%
Lazzarini et al., 2013 (42)	2	1	1	1	1	0	0	0	1	70%
Lazzarini et al., 2016 (27)	1	1	1	1	1	1	1	1	1	90%
Lewin et al., 2003 (80)	1	1	0	0	1	1	1	1	1	70%
Lewin et al., 2007 (81)	1	1	0	0	1	1	1	1	1	70%
Liew et al., 1998 (33)	0	1	0	0	1	0	1	1	1	50%
Lim et al., 2006 (99)	0	1	1	1	0	0	0	1	1	50%

Madsen et al., 1997 (73)	0	1	1	1	1	1	1	1	1	80%
Martin & Keenan, 1994 (58)	0	1	1	0	1	1	1	1	1	70%
McErlean et al., 2002 (59)	0	1	1	0	1	1	1	1	1	70%
McGill et al., 2005 (88)	0	1	0	0	1	1	1	1	1	60%
McGowan et al., 1996 (60)	0	1	1	0	1	1	1	1	1	70%
McGowan et al., 2000 (90)	0	1	1	0	1	1	1	1	1	70%
McRae et al., 2014 (91)	0	1	1	1	0	0	0	0	1	40%
McRae et al., 2016 (23)	0	1	1	0	1	0	0	1	1	50%
Miles et al., 2013 (50)	0	1	0	0	1	1	1	1	1	60%
Morey & Porock, 1997 (64)	0	1	1	0	1	1	1	1	1	70%
Muller et al., 1999 (34)	0	1	1	0	1	0	0	0	1	40%

Mulligan et al., 2011 (61)	2	1	1	0	1	1	1	1	1	90%
O'Brien et al., 2013 (102)	0	1	0	1	1	0	1	1	1	60%
O'Rourke et al., 2002 (96)	0	1	1	1	1	1	1	1	1	80%
Parker, 2014 (105)	0	1	0	0	0	1	1	1	1	50%
Pearson et al., 2000 (51)	2	1	1	0	1	1	1	1	1	90%
Perrin et al., 2006 (41)	0	1	1	1	0	0	0	1	1	50%
Perrin et al., 2011 (87)	0	0	0	0	1	0	0	1	1	30%
Perrin et al., 2012 (86)	1	0	1	1	1	1	1	1	1	80%
Prentice, 2007 (65)	1	1	0	0	1	1	1	1	1	70%
Quality and Safety Branch, 2006 (66)	2	1	1	0	1	1	1	1	1	90%
Rayner, 2007 (36)	0	1	0	0	0	1	0	1	1	40%

Rodrigues et al., 2016 (22)	0	1	1	1	0	0	0	0	1	40%
Roosen et al., 2010 (52)	0	1	1	0	0	0	0	0	1	30%
Santamaria et al., 2004 (35)	1	1	1	0	1	1	1	1	1	80%
Santamaria et al., 2005 (72)	2	1	0	0	1	1	1	1	1	80%
Santamaria et al., 2009 (74)	2	1	0	1	1	0	0	1	1	70%
Santamaria et al., 2012 (100)	0	1	0	0	1	0	1	1	1	50%
Smith & McGuinness., 2010 (108)	1	1	0	0	1	0	0	1	1	50%
Stacey et al., 1997 (107)	0	1	1	0	1	0	1	1	1	60%
Tapp et al., 2003 (89)	2	1	1	0	1	0	0	1	1	70%
Walker et al., 2014 (37)	1	1	1	1	0	0	0	1	1	60%
Webster et al., 2010 (46)	0	1	1	0	1	1	1	1	1	70%

Webster et al., 2011 (44)	0	1	0	0	1	1	1	1	1	60%
Webster et al., 2015 (45)	0	1	0	0	1	1	1	1	1	60%
Weller et al., 2012 (103)	1	1	1	0	1	0	1	1	1	70%
Wright & Tiziani, 1996 (47)	0	1	1	1	1	1	1	1	1	80%
Young et al., 2000a (62)	0	1	0	0	1	1	1	1	1	60%
Young et al., 2000b (82)	0	1	0	0	1	1	1	1	1	60%
Young et al., 2002 (67)	0	1	0	1	1	1	1	1	1	70%