The prevalence and incidence of chronic wounds: a literature review

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ABSTRACT

The epidemiological profile of chronic wounds is not well known, which prevents making good estimates of the costs that arise. This study is a comprehensive review of published data and the available epidemiological evidence for prevalence and incidence rates of chronic wounds is included. The search process revealed 854 studies, 69 of which met the selection criteria for inclusion. Of these studies, 42 were on pressure ulcer, 20 on diabetic ulcer, 10 on venous ulcer, and 3 on artery insufficiency ulcer. There was large variability among estimates and pooling data in a meta-analysis was not feasible. The study results with respect to prevalence and incidence in comparable settings provided an important insight into the potential size and scope of the health problem.

INTRODUCTION

Chronic wounds result in significant functional impairment, reduction in quality of life, and large financial costs for patients and the health care system. Yet the epidemiological profile of chronic wounds hasn't been well established. This precludes estimation of the disease burden and so information that could improve the allocation of scarce health care resources towards prevention and management activities is missing. Knowledge of the scale of the health problem is important for policy making to improve wound care and prevention[1]. The present study describes the available epidemiological evidence and summarises prevalence and incidence rates of chronic wounds.

Prevalence is a measure of the proportion of people with a chronic wound at a point in time or during a time period in a defined population. The former is known as point prevalence, the latter period prevalence. Prevalence indicates the burden of chronic wounds in a defined population. The incidence of chronic wounds is a measure of the number of people with a newly developed chronic wound over a defined time period. It is also known as cumulative incidence. It shows a rate of development of chronic wounds in a defined population. Incidence is increasingly used as an indicator of the quality of care.

Standardised pathological definition of the conditions are important for valid estimates of the epidemiology of chronic wounds. The Wound Healing Society defines a chronic wound as one that has failed to proceed through an orderly and timely reparative process to produce anatomic and functional integrity or that has proceeded through the repair process without establishing a sustained anatomic and functional result[2]. Based on their aetiologies, the Wound Healing Society classifies chronic wounds into four categories: pressure ulcer, diabetic ulcer, venous ulcer and artery insufficiency ulcer[3]. The present review focused on the prevalence and incidence of the four categories of chronic wounds.

METHOD

Search strategy

We searched electronic databases including Medline, EMBASE, CINAHL and Cochrane Library to identify relevant studies using MeSH terms 'prevalence' and 'incidence' combined with 'pressure ulcer' or 'diabetic ulcer' or 'venous ulcer' or 'artery insufficiency ulcer'. Reference lists of retrieved articles were read to identify studies eligible for inclusion. The search was limited to studies published in English from January 1980 to June 2012. The detailed search strategies are in Appendix A.

Inclusion and exclusion criteria

Studies were included if they estimated prevalence and incidence of chronic wounds as an outcome measure. As the present study focused on pressure ulcer, diabetic ulcer, venous ulcer and artery insufficiency ulcer, studies were excluded if they did not specifically report prevalence or incidence as an outcome measure for one of the four categories of chronic wounds. The search process is in Appendix B.

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RESULTS

The search strategy yielded 854 studies, 69 of which met the selection criteria for inclusion. Of the 69 included studies, 42 were on pressure ulcer, 20 on diabetic ulcer, 10 on venous ulcer, and 3 on artery insufficiency ulcer. Three studies covered more than one category of chronic wounds. Search results are in Tables 1–4.

Prevalence of pressure ulcer

Thirty-eight studies conducted in 11 countries reported the prevalence of pressure ulcer. Estimates varied from 1.1% to 26.7% in the hospital setting[4-26], 6% to 29%[8,9,27-30] in the community setting, 7.6% to 53.2% in the nursing home setting[5,9,26,31-33], and 13.1% to 28.7% in intensive care units (ICU)[22,34]. In terms of study density distribution with respect to prevalence, 35% of the studies reported a prevalence between 1.1% and 9.5%[4-11,34], 46% reported a prevalence between 11.1% and 18.1%[5,12-21,34] and 26% reported a prevalence between 22% and 28.7% in the hospital setting[15,22-26]. The lowest reported prevalence was between 0.31% and 0.70% estimated as annual period prevalence among the elderly patient population in the general medical practice in the United Kingdom[35]. The highest reported prevalence was 53.3% among residents in a long-term care facility in Canada[33]. Estimates of the prevalence of different stages of pressure ulcer also varied considerably from study to study. A Canadian study[36] conducted in ICU reported a prevalence of 62% for stage I, 29% for stage II and 4% for stage III and IV. A Dutch study[22] conducted in ICU reported a much lower prevalence of 10.5% for stage I, 11.8% stage II, 5.2% for stage III and 1.3% for stage IV.

Incidence of pressure ulcer

Twenty-six studies reported the incidence of pressure ulcer. Estimates were in a range from 0% over a 4-month period to 29% over a 6-week period in the hospital setting[4,10,12,13,16-20,24,25,37-45], 6.3% over a 52-day period to 20% over a 6-week period in the community setting[27-29], and 11.6%–11.7% over a period of 41–42 days in the nursing home setting[33]. In terms of study density distribution, 71% of the studies reported an incidence between 0% over a 4-month period to 9% over a 5-day period[4,10,12,13,16,17,19,20,25,43,45], and 23% reported an incidence between 11.2% and 17.9% over a 1-year period in the hospital setting[18,24,37,41]. As expected, the incidence of pressure ulcer varied considerably from stage to stage. A United States (US) study reported an incidence of 21.5% for all stages of pressure ulcer and 2% for stage II–IV over a 6-day period in the hospital setting[39]. An Australian study reported a much lower incidence of 6.5% for all stages of pressure ulcer, and 2% for stage II–IV over a 7-day period in the hospital setting[13]. In the home care setting, a US study reported an incidence of 6.3% for all stages of pressure ulcer, 3.1% for stage I, 3.2% for stage II, 0.1% for stage III and 0% for stage IV over a period of 52.5 days[27].

Table 1: Prevalence and incidence rates of pressure ulcer

Country	Author/year	Overall prevalence (I–IV)	Overall incidence rate (I–IV)	Prevalence rate by stage				Incidence rate by stage				Incidence duration (days)	Setting
				I	II	III	IV	I	II	III	IV		
Hospital													
Netherlands	Bours *et al.*, 2001	28.7%		10.5%	11.8%	5.2%	1.3%						ICU
US	Allman *et al.*, 1995		12.9%									9 (median)	
US	Bujosa *et al.*, 2011	22% (in 2002) 25% (in 2008) 24% (in 2011)											
Singapore	Chan *et al.*, 2005	18.1%	8.1%									28	
Australia	Charlier *et al.*, 2001	12%	6.5% 2% (II–IV)									7	
UK	Clark *et al.*, 1994	1.1%	4.03%									365	
Canada	Cole *et al.*, 2004	21.4%	17.9%									365	
Sweden	Gunningberg *et al.*, 2011 (Swedish university hospital) (Swedish general hospital) (US hospital)	 17.6% 9.5% 6.5%											
Sweden	Gunningberg *et al.*, 2012	16.6%											
US	Hunter *et al.*, 1992	25%	0%									120	
Canada	Jacksich 1997	6.03%											
UK	James *et al.*, 2010	13.9% 26.7%											
US	Jenkins *et al.*, 2010	15.8%	2.8%	36%	34%	11%	5%					90	
Germany	Kottner *et al.*, 2009	9.2% 5% (II–IV)											
Germany	Lahmann *et al.*, 2006	24.6%											
US	Langemo 2003	13. 1 %											ICU
Australia	Li *et al.*, 2011	8.9% (in 2009) 6.1% (in 2010)											
Netherlands	Schoonhoven *et al.*, 2007	6% (II–IV)	11% (II–IV) 0.06 (II–IV)									84 7	
US	Schue *et al.*, 1999	12%	6%									1 year	Rehab unit

Table 1 (continued): Prevalence and incidence rates of pressure ulcer

Country	Author/year	Overall prevalence (I–IV)	Overall incidence rate (I–IV)	Prevalence rate by stage				Incidence rate by stage				Incidence duration (days)	Setting
				I	II	III	IV	I	II	III	IV		
US	Schultz *et al.*, 1999		21.5%									6	
			2% (II–IV)									6	
US	Scott *et al.*, 2006		7.0-8.3*									1 year	
Spain	Soldevilla *et al.*, 2006	8.81%											
Germany	Stausberg *et al.*, 2005	5.3%	0.6%									180	Clinic
Canada	Van DenKerkhof, 2011												
		17% (in 1998)	11.2%									365	
	(in 2007)	12.8%											
	(in 1998)	13.1% (II–IV)											
	(in 2006)	7.9% (II–IV)	6.8%									1 years	
US	Whittington *et al.*,, 2000	15%	7%									5	Acute care
US	Whittington *et al.*, 2004	16% (in 2004)	7%									5	Acute care
		15% (in 2003)	7%									5	
		14% (in 2002)	8%									5	
		14% (in 2001)	7%									5	
		16% (in 2000)	9%									5	
		17% (in 1999)	8%									5	
Canada	Pokorny *et al.*, 2003			62%	29%	4%	4%						ICU
US	Fife *et al.*, 2001		12.4%									6.4	ICU
US	Eachempati *et al.*, 2001												ICU
	(Phase 1)		3.8% (≥II)									>7	
	(Phase 2)		8.0% (≥II)									>7	
US	Gosnell *et al.*, 1992		8.4%									3 months	
US	Meehan *et al.*, 1994	11.1% (overall)											
US	Meehan *et al.*,, 1990	9.2% (overall)											
UK	Bridel *et al.*, 1996		2.2%									1 year	
UK	Clarke *et al.*, 1988		29%									≤42	

**100,000 person-year (with pressure ulcer as primary diagnosis)*

Table 1 (continued): Prevalence and incidence rates of pressure ulcer

Country	Author/year	Overall prevalence (I–IV)	Overall incidence rate (I–IV)	Prevalence rate by stage				Incidence rate by stage				Incidence duration (days)	Setting
				I	II	III	IV	I	II	III	IV		
Community													
US	Bergquist *et al.*, 1999	6%	6.3%					3.1%	3.2%	0.1%	0%	52.5	Home care
US	Hanson *et al.*, 1991	13%	13%									270	Hospice
Italy	Landi *et al.*, 2007	18%											Home care
Australia	Li *et al.*, 2011	8.9% (in 2009) 6.1% (in 2010)											Community care
UK	Margolis *et al.*, 2002	0.31–0.70% (annual prev.)	0.60* 0.58* 0.57*									90 180 270	GP record
UK	Clarke *et al.*, 1988		20%									≤42	
US	Oot-Giromini *et al.*, 1993	29%	16.5%									1 year	
Spain	Soldevilla *et al.*, 2006	8.34%											
				*100 person-years									
Nursing home													
US	Brandeis *et al.*, 1990 (Admission group) (Resident group)	 17.4% 8.9%	 13.2%(II–IV) 9.5% (II–IV)	 6.1% 2.1%	 6.3% 3.7%	 2.6% 2%	 2.4% 1.1%					 1 year 1 year	
Spain	Casimiro *et al.*, 2002	35.7%											
Canada	Davis *et al.*,, 2001 (Facility 1) (Facility 2)	 36.8% 53.2%	 11.7% 11.6%									 41 42	
Sweden	Gunningberg *et al.*, 2012	14.5%											
Germany	Lahmann *et al.*, 2006	13.9%											
Spain	Soldevilla *et al.*, 2006	7.6%											Residential

Prevalence of diabetic ulcer

Twelve studies conducted in eight countries reported prevalence of diabetic ulcer. Estimates varied from 1.2% to 20.4% in the hospital setting[46,47], and from 0.02%–10% in the community setting[9,48-56]. In terms of study density distribution, 90% of the studies reported a prevalence between 0.02% and 9% in the community setting[9,48-57]. The highest reported prevalence was 20.4% among hospitalised diabetic patients in the Netherlands[47], and the lowest was 0.02% among patients, mainly in primary health care settings in Sweden[56].

Incidence of diabetic ulcer

Ten studies reported the incidence of diabetic ulcer. Estimates were in a range between 1.8% over a 6-month period to 41% over a 12-month period in the community setting[50,55,57-62]. One US study reported an incidence of 5/100 person-years in the hospital setting over a 3.38-year period[63] and another US study reported an incidence of 68.4/1000 person-years over a 1-year period among the diabetic patient population in the community setting[64]. In terms of study density distribution, 75% of the studies reported an incidence between 1.8% and 5.8% over a period from six months to 3.38 years[50,55,57-59,62] and about 25% of the studies reported an incidence between 31.7% and 41% over a 1-year period[59,61].

Prevalence of venous ulcer

Eight studies conducted in six countries reported the prevalence of venous ulcer. Estimates ranged from 0.05% to 1% in the community setting[9,56,65-67]. Two studies reported an annual period prevalence of 0.26%–1.48% (over a 10-year study period)[68] and 1.69% in the community setting[69]. The prevalence was estimated to be 2.5% in the nursing home setting[70] and 0.05% in the hospital setting[56].

Incidence of venous ulcer

Five studies reported the incidence of venous ulcer. Estimates were in a range from 1% over a 90-day period to 2.2% over a 1-year period among residents in the long-term care facility[70] and 0.02% to 0.35% over a 1-year period in the general population[67]. When measured in person-years, the incidence varied from 18/100,000 person-years among the general population[71] to 1.2/100 person-years in the GP-based elderly patient population[69]. One study reported marked variations in the incidence from 0.7% when venous ulcer developed at the same time as venous stasis syndrome to 3.3% when venous ulcer developed after venous stasis syndrome over a 5-year period; and from 3.7% when venous ulcer developed at the same time as venous stasis syndrome to 7.3% when venous ulcer developed after venous stasis syndrome over a 20-year period[72].

Prevalence and incidence of artery insufficiency ulcer

Data on the prevalence and incidence of artery insufficiency ulcer was scarce. Our search strategy only generated three studies. Two studies reported an overall prevalence of 0.01% in the community and primary health care setting[9,56]. One was a review by an international task force, which reported an incidence of 0.02%–0.35% over a 1-year period in the general population.

DISCUSSION

This study revealed a wide variation in the estimates of the prevalence and incidence of chronic wounds among current epidemiological studies. Although a direct comparison of the wide range of the estimates was impossible, the study density distributions with respect to prevalence and incidence in comparable settings provided an important insight into the potential size and scope of the health problem.

While the study population, stage of the condition, care setting, wound risk management and care quality are expected to influence the prevalence and incidence of chronic wounds, the range of the reported variations in some estimates is difficult to interpret. For instance, a Canadian study reported a pressure ulcer prevalence of 53.2% among the residents in a long-term care facility[33] while a Spanish study estimated a prevalence of 7.6% among the residents in similar care settings[9]. The wide disparity of the epidemiological

Table 2: Prevalence and incidence — diabetic foot ulcer

Country	Author/year	Prevalence rate	Incidence rate	Incidence duration (days)	Note
Hospital					
US	Boyko *et al.*, 2006		5/100 person-years	3.38 (years)	Medical centre
Egypt	El-Nahas *et al.*, 2008	1.2%			Outpatient clinic in hospital
Netherlands	Bouter *et al.*, 1993	20.4%			Diabetic patients in hospital Diabetic patients in hospital
Community					
Ireland	Hurley *et al.*, 2011	3.7%			In the general practice
US	Ramsey *et al.*, 1999		5.8%	3 (years)	Health maintenance organisation
Taiwan	Tseng *et al.*, 2003	2.9%			Non-type I patients in comm.
Spain	Soldevilla *et al.*, 2006	0.53% in diabetic population 0.002% (age: 15–40) 0.016% (age: 41–64) 0.085% (age: 65–74) 0.134% (age: 75–84) 0.127% (age: ≥85)			
Sweden	Ebbeskog *et al.*, 1996 (general popu.)	0.02%			primary community setting
US	LeMaster *et al.*, 2008		4.5% (predicted) 31.7% (predicted)	1 year 1 year	With no history of diabetic ulcer With history of diabetic ulcer
Tanzania	Abbas *et al.*, 2007		11% 14%	1 year 1 year	Incidence for 2005 Incidence for 2006
UK	Lincoln *et al.*, 2008		30% (intervention group) 21% (control group) 41% (intervention group) 41% (control group)	6 months 6 months 1 year 1 year	With diabetic foot history With diabetic foot history With diabetic foot history With diabetic foot history
US	Lavery *et al.*, 2003		68.4/1000 person-years 71.2/1000 person-years 63.7/1000 person-year 83.1/1000 person-year	1 year 1 year 1 year 1 year	For overall diabetic patients Non-Hispanic white Mexican Americans Other ethnic background
US	Moss *et al.*, 1992		2.4% 2.6%	1 year 1 year	Diabetic population (age<30) Diabetic population (age>=30)

Table 2 (continued): Prevalence and incidence — diabetic foot ulcer

Country	Author/year	Prevalence rate	Incidence rate	Incidence duration (days)	Note
Sweden	Borssen *et al.*, 1990	10% (patients with IDDM) 9% (patients with NIDDM)	3% (patients with IDDM) 9% (patients with NIDDM)	1 year	
US	Margolis *et al.*, 2011	8.1% /year (in 2006)			
Sweden	Rosenqvist, 1984 (annual prevalence rate in diab population)	4.4% 8.1% /year (in 2007) 8% /year (2008)			
UK	Walters *et al.*, 1992	7.4% (current and past ulcer) 2.5% (in non-diabetic group)			Home or hospital
UK	Kumar *et al.*, 1994	5.3% (in current & past ulcers)			Type 2 patients in community
Sweden	Henriksson *et al.*, 2000	5.4%	1.8%	6 months	Type 2 diabetic population
UK	Abbott *et al.*, 2002		2.2%	Annual	Community-based diabetic patients

estimates of the included studies warrants examination of potential method bias.

There was significant heterogeneity in terms of study design and data collection method among the included studies. It varied from cross-sectional study, retrospective cohort study, prospective cohort study to randomised control study. Retrospective studies had to rely on past medical records for data collection. It was impossible to ensure consistency and accuracy in assessing and recording chronic wounds. In fact, there was evidence to suggest that a high proportion of chronic wounds failed to be documented[20]. This could lead to under-reporting of the prevalence and incidence of chronic wounds. For cross-sectional and prospective cohort studies, some relied on direct skin examination; others used ward survey, postal survey or medical record to determine the presence or development of chronic wounds. No studies reported inter-rater reliability (IRR) testing. While most studies reported point prevalence, some reported period prevalence[51,68,69]. For incidence, most studies estimated cumulative incidence in percentage ratio, while others estimated incidence density rate in person-years[35,40,69,71]. The reported time interval of incidence varied significantly from five days to 3.38 years among the included studies. Based on the reported methodological data, it was difficult to establish comparability of chronic wound assessment and recording methods across studies. Heterogeneity in methods used in prevalence and incidence surveys has been shown to contribute to significant variations in prevalence and incidence estimates[19,73,74].

The sample size and inclusion and exclusion criteria are important parameters influencing the precision of the estimates of prevalence and incidence in defined populations[74-76]. The sample size of the study populations in the included studies varied greatly from 30[44] to 40,456[45]. Few studies reported an a priori calculation of sample size. Most studies did not report inclusion and exclusion criteria, nor wound risk profile of the study population. Potential sample size-related bias or study population selection-related bias may have contributed to the significant variance in the prevalence and incidence estimates reported in the included studies.

Conducting a prevalence and incidence study can be time-consuming and costly. In order to produce valid, reliable and comparable epidemiological estimates to better inform clinical practice and health resource allocation for effective prevention and management of chronic wounds, it is important to ensure high methodological rigour in terms of study design, data collection, analysis and reporting. It is recommended that standardised data collection and recording protocols, including definition of study populations, specification of inclusion and exclusion criteria and study setting, identification and classification of chronic wounds, wound risk assessment, a priori calculation of sample size and IRR, be established and implemented. It is also important to ensure that surveyors or data collectors are properly trained and qualified for conducting valid data collection and recording. The recently published international guidelines on how to conduct a study on the prevalence and incidence of pressure ulcer[1] is essential to improving the quality and value of epidemiological studies on pressure ulcer. Similar international or national guidelines for how

Table 3: Prevalence and incidence — venous ulcer

Country	Author/year	Prevalence rate	Incidence rate	Incidence duration (days)	Note
Hospital					
Sweden	Ebbeskog *et al.*, 1996	0.05%			Mixed (hospital, primary, home)
Community					
Australia	Baker *et al.*, 1991	0.062% 0.33%			In general population In general population aged ≥60
US	Gloviczki *et al.*, 2012	0.26%/year (in 1991)			In general population
		1.48%/year (in 2009/2010)			
US	Heit *et al.*, 2001		18/100,000 person-years		Community population
Germany	Junger *et al.*, 2009	0.3%			Volunteers from community
UK	Margolis *et al.*, 2002	1.69%/year	1.2 /100 person-years 1.16 /100 person-years 1.13 /100 person-years	90 180 270	Elderly population GP-based
Spain	Soldevilla *et al.*, 2006	0.09% (overall) 0.001% (age:15–40) 0.05% (age:41–64) 0.24% (age:65–74) 0.44% (age:75–84) 0.75% (≥85)			Primary and residential setting
Unspecified	Clement *et al.*, 1999	0.3% (active ulcer) 1% in the adult population	0.02–0.35 %	1 year	In the general population General population assumed.
US	Mohr *et al.*, 2000		0.7%*/3.3%† 1.5%*/6.1%† 3.7%*/7.3%†	5 years 10 years 20 years	population-based
Nursing home					
US	Wipke-Tevis *et al.*, 2000	2.5%	1% 1.3% 1.8% 2.2%	90 180 270 365	Long-term care facility

*:venous ulcer developed at the same time as venous stasis syndrome; †: venous ulcer developed after venous stasis syndrome

Table 4: Prevalence and incidence — artery insufficiency ulcer

Country	Author/year	Prevalence rate	Incidence rate	Incidence duration (days)	Note
Hospital					
Sweden	Ebbeskog *et al.*, 1996	0.01% (in general population)			Mixed (hospital, primary, home)
Community					
Spain	Soldevilla *et al.*, 2006	0.013% (overall) 0% (age:15–40) 0.006% (age:41–64) 0.039% (age:65–74) 0.057% (age:75–84) 0.127% (age:≥85)			Primary health care setting
Unspecified	Clement *et al.*, 1999 (secondary data)	0.3% (active ulcer) 1% in the adult population	0.02-0.35 %	1 year	Review by a task force General population assumed.

to conduct a study on the prevalence and incidence of other categories of chronic wounds are also needed.

This study is the first attempt to present an overview of the prevalence and incidence of pressure ulcer, diabetic ulcer, venous ulcer and artery inefficiency ulcer in one study. It has limitations. Owing to the scope of the study and insufficient data provided in the included studies, the present study did not investigate the impact casemix, wound risk profile, care quality or study setting had on the reported variations in the prevalence and incidence of chronic wounds. We mainly searched Medline, EMBASE, CINAHL and the Cochrane Library to identify relevant studies for inclusion in the present review. Therefore, it is unlikely to exhaust all the existing studies on the topic. However, we believe that the range of the epidemiological estimates identified in the present study is wide enough to provide an important indicator of the potential scale of the health problem. Although we included 'mortality' as a search term, the relevant data was scarce and we chose to only focus on the incidence and prevalence of chronic wounds in this study. Give that there was very limited epidemiological evidence available on artery insufficiency ulcer, we included secondary data from a review by an international task force[67]. More epidemiological study on this condition is clearly needed.

CONCLUSION

Chronic wounds are a significant health problem confronting patients and the health care system. They require adequate health resources allocation to effectively tackle the health problem. Further epidemiological studies with high methodological rigour are needed to provide accurate estimates of the prevalence and incidence of chronic wounds, and to better inform public health decision making on effective intervention strategy for prevention and treatment of the chronic conditions.

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Appendix A: Search strategy

Medline

1. MH 'Prevalence'/ (159291)
2. MH 'Incidence'/ (152048)
3. MH 'Epidemiology'/ (11189)
4. MH 'Mortality'/ (31849)
5. Diabetic ulcer/ (688)
6. 5 AND 1/ (23)
7. 5 AND 2/ (18)
8. 5 AND 3/ (0)
9. 5 AND 4 / (0)
10. OR (6–9) / (40)
11. Diabetic foot ulcer/ (495)
12. 11 AND 1 / (19)
13. 11 AND 2 / (18)
14. 11 AND 3 / (0)
15. 11 AND 4 /(0)
16. OR (12–15) / (36)
17. MH 'Foot Ulcer' / (1317)
18. 17 AND 1 / (36)
19. 17 AND 2 / (26)
20. 17 AND 3 / (0)
21. 17 AND 4 / (0)
22. OR (18–21) / (61)
23. MH 'Pressure Ulcer' / (8998)
24. 23 AND 1 AND 2 / (145)
25. 23 AND 3 / (1)
26. 23 AND 4 / (15)
27. OR (24–26) / (161)
28. Decubitus ulcer / (871)
29. 28 AND 1 / (15)
30. 28 AND 2/ (21)
31. 28 AND 3/ (1)
32. 28 AND 4 /(2)
33. OR (29–32) / (36)
34. Venous ulcer / (933)
35. 34 AND 1 / (33)
36. 34 AND 2/ (13)
37. 34 AND 3/ (0)
38. 34 AND 4 / (0)
39. OR (35–38) / (42)
40. MH "Varicose Ulcer" / (3520)
41. 40 AND 1 / (48)
42. 40 AND 2/ (32)
43. 40 AND 3 / (0)
44. 40 AND 4 (0)
45. OR (41–44) / (74)
46. Stasis ulcer / (147)
47. 46 AND 1 /(3)
48. 46 AND 2 /(3)
49. 46 AND 3 /(0)
50. 46 AND 4 / (0)
51. OR (47–50) / (6)
52. Insufficient artery ulcer / (2244)
53. 52 AND 1 / (35)
54. 52 AND 2 / (25)
55. 52 AND 3 / (0)
56. 52 AND 4 / (0)
57. OR (53–56) / (58)
58. Chronic wound / (1560)
59. 58 AND 1 / (21)
60. 58 AND 2 / (12)
61. 58 AND 3 / (0)
62. 58 AND 4 / (0)
63. OR (59-62) / (31)
64. OR (10, 16, 22, 27, 33, 39, 45, 51, 57, 63) / (455)
65. Limiters — Date of Publication from: 19800101-20120631; English Language; Human / (391)

EMBASE

1. 'prevalence'/exp/mj / (17490)
2. 'incidence'/exp/mj /(9798)
3. 'epidemiology/mj/ (32785)
4. 'mortality' mj/ (44489)
5. 'diabetic foot'/exp/ (7394)
6. 5 AND 1 / (13)
7. 5 AND 2 / (1)
8. 5 AND 3 / (1)
9. 5 AND 4 / (16)
10. OR (6-9) / (31)
11. 'diabetic'exp and 'ulcer'exp/ (13582)
12. 11 AND 1/ (31)
13. 11 AND 2 / (4)
14. 11 AND 3 / (10)
15. 11 AND 4 / (32)
16. OR (12-15) / (98)
17. 'decubitus'/exp / (13216)
18. 17 AND 1 / (27)
19. 17 AND 2 / (6)
20. 17 AND 3 / (12)
21. 17 AND 4 / (51)
22. OR (18-21) / (89)
23. Venous and 'ulcer'/exp / (6969)
24. 23 AND 1 / (9)
25. 23 AND 2 / (1)
26. 23 AND 3 / (6)
27. 23 AND 4 / (12)
28. OR (24-27) / (27)
29. 'varicosis'/exp/mj / (27710)
30. 29 AND 1 / (6)
31. 29 AND 2 / (4)
32. 29 AND 3 / (11)
33. 29 AND 4 / (60)
34. OR (30-33) / (80)
35. 'artery'/exp AND 'ulcer'/exp / (2051)
36. 35 AND 1 / (1)
37. 35 AND 2 / (0)
38. 35 AND 3 / (0)
39. 35 AND 4 / (5)
40. OR (36-39) / (6)
41. 'chronic' AND 'wound'/exp / (11388)
42. 41 AND 1 / (4)
43. 41 AND 2 / (0)
44. 41 AND 3 / (3)
45. 41 AND 4 / (11)
46. OR (42-45) / (18)
47. OR (10, 16, 22, 28, 34, 40, 46) / (294)
48. Limiters: 1980 – 2012; human / (246)

Appendix A (continued): Search strategy

Cochrane Library

1. MH 'prevalence'/exp / (3014)
2. MH 'incidence'/exp / (6545)
3. MH 'epidemiology'/exp/ (33)
4. MH 'mortality'/exp/ (9414)
5. 'diabetic ulcer'/ (742)
6. 5 AND 1 / (2)
7. 5 AND 2 / (5)
8. 5 AND 3 / (0)
9. 5 AND 4 / (7)
10. OR (6-9) / (14)
11. 'diabetic foot ulcer'/ (592)
12. 10 AND 1 / (2)
13. 10 AND 2 / (3)
14. 10 AND 3 / (0)
15. 10 AND 4 /(4)
16. OR (12-15) / (9)
17. 'foot ulcer' / (767)
18. 17 AND 1 / (3)
19. 17 AND 2 / (4)
20. 17 AND 3 / (0)
21. 17 AND 4 / (4)
22. OR (18-21) / (11)
23. 'pressure ulcer' / (1542)
24. 23 AND 1 / (11)
25. 23 AND 2 / (49)
26. 23 AND 3 / (0)
27. 23 AND 4 / (12)
28. OR (24-27) / (68)
29. 'Decubitus ulcer' / (172)
30. 29 AND 1 / (1)
31. 29 AND 2 / (2)
32. 29 AND 3 / (0)
33. 30 AND 4 / (0)
34. OR (30-33) / (3)
35. 'venous ulcer' / (1079)
36. 35 AND 1 / (1)
37. 35 AND 2 /(4)
38. 35 AND 3/ (0)
39. 35 AND 4 / (7)
40. OR (36-39) / (11)
41. 'Varicose ulcer' / (423)
42. 41 AND 1 / (1)
43. 41 AND 2 / (1)
44. 41 AND 3 / (0)
45. 41 AND 4 / (0)
46. OR (42-45) / (2)
47. 'Stasis ulcer' / (116)
48. 47 AND 1 / (0)
49. 47 AND 2 / (0)
50. 47 AND 3 / (0)
51. 47 AND 4 / (0)
52. Insufficient artery ulcer / (102)
53. 52 AND 1 / (0)
54. 52 AND 2 / (0)
55. 52 AND 3 / (0)
56. 52 AND 4 / (5)
57. OR (53-56) / (5)
58. Chronic wound / (1460)
59. 58 AND 1 / (3)
60. 58 AND 2 / (16)
61. 58 AND 3 / (0)
62. 58 AND 4 / (16)
63 OR (59-62) / (34)
64. OR (10,16,22,28,34,40,46,57,63) / (102)
65. Limiters – 1980 – 2012 (102)

CINAHL

1. MH 'Prevalence'/ (23698)
2. MH 'Incidence'/ (18341)
3. MH 'Epidemiology'/ (2131)
4. MH 'Mortality'/ (11538)
5. 'Diabetic ulcer'/ (321)
6. 5 AND 1/ (5)
7. 5 AND 2/ (5)
8. 5 AND 3/ (0)
9. 5 AND 4 / (0)
10. OR (6-9) / (10)
11. 'Diabetic foot ulcer'/ (261)
12. 11 AND 1 / (4)
13. 11 AND 2 / (5)
14. 11 AND 3 / (0)
15. 11 AND 4 /(0)
16. OR (12-15) / (9)
17. MH 'Foot Ulcer' / (688)
18. 17 AND 1 / (9)
19. 17 AND 2 / (6)
20. 17 AND 3 / (0)
21. 17 AND 4 / (1)
22. OR (18-21) / (16)
23. MH 'Pressure Ulcer' / (8998)
24. 23 AND 1 AND 2 / (78)
25. 23 AND 3 / (11)
26. 23 AND 4 / (10)
27. OR (24-26) / (97)
28. "Decubitus ulcer" / (108)
29. 28 AND 1 / (4)
30. 28 AND 2/(4)
31. 28 AND 3/(0)
32. 28 AND 4 /(0)
33. OR (29-32) / (7)
34. "Venous ulcer" / (1419)
35. 34 AND 1 / (21)
36. 34 AND 2/ (7)
37. 34 AND 3/ (0)
38. 34 AND 4 / (1)
39. OR (35-38) /(27)
40. MH "Varicose Ulcer" / (1313)
41. 40 AND 1 / (21)
42. 40 AND 2/ (6)
43. 40 AND 3 / (0)
44. 40 AND 4 (1)
45. OR (41-44) / (26)
46. "Stasis ulcer" / (24)
47. 46 AND 1 /(0)
48. 46 AND 2 /(0)
49. 46 AND 3 /(0)
50. 46 AND 4 / (0)
51. "Insufficient artery ulcer" / (182)
52. 51 AND 1 / (6)
53. 51 AND 2 / (3)
54. 51 AND 3 / (0)
55. 51 AND 4 / (1)
56. OR (52-55) / (10)
57. "Chronic wound" / (736)
58. 57 AND 1 / (5)
59. 57 AND 2 / (4)
60. 57 AND 3 / (0)
61. 57 AND 4 / (0)
62. OR (58-61) / (9)
63. OR (10, 16, 22, 27, 33, 39, 45, 56, 62) / (168)
64. Limiters: Published Date from: 19800101-20120631; Human; Language: English / (102)

Appendix B: The flow chart