Pain assessment tools for chronic lower limb wounds: A scoping review

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ABSTRACT

Background Pain in chronic lower limb wounds has been identified as one of the most painful wounds and negatively impacts health-related quality of life and wound healing. In order to optimise pain management, it is necessary to accurately assess wound pain, however there is no identified reliable and valid assessment specifically for wound-related pain in the lower extremities.

Objective The objective of this review was to identify how wound-related pain is assessed in people with chronic lower limb wounds.

Design A scoping review of the literature was conducted.

Methods A search of MEDLINE, EMBASE, CINAHL and PsycINFO was undertaken of eligible studies that reported on assessment tools for pain in chronic lower limb wounds from inception 1946 to current June 2018. Systematic reviews, meta-analyses, randomised controlled trials, observational and qualitative studies were included.

Discussion This study investigated the current assessment tools being utilised for pain in chronic lower limb wounds.

Conclusion There is no validated pain assessment tool for patients with chronic lower limb wounds.

BACKGROUND

Wound-related pain is a frequent symptom and a major issue for people suffering with chronic lower limb wounds. It is one of the key characteristics which distresses patients and has a significant impact on patients' quality of life[1]. The prevalence of pain in chronic wounds ranges from 48% to 81%, with up to 46% reporting moderate to severe pain[2]. Often wound-related pain is either dismissed or not assessed appropriately, resulting in pain being inadequately managed[3].

The presence of wound pain is an indicator of ineffective wound management, whereby the underlying causal pathology has not been identified nor treated or infection is present. Wound-related pain should be treated as one of the main priorities in chronic wound management together with addressing the cause[4]. Ineffective wound pain management can result in delayed healing and lack of compliance by the patient[5]. Health-related quality of life studies have consistently shown that if pain is appropriately managed, quality of life will improve which, in turn, leads to increased adherence to treatment and improved mobility, which all influence wound healing[6-8].

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Chronic persistent wound pain can lead to anxiety, agitation, impaired mobility, slow rehabilitation and increased health care costs[9]. However, many older patients believe that pain is an inevitable part of disease or medical condition; therefore they do not complain about pain, or are reluctant to vocalise their experience about their pain because it will annoy or distract the clinician from treating the wound[10,11]. Similarly, practitioners often give wound pain a low priority because they are preoccupied with treating the visual pathology[12,13].

Wound pain and intensity are highly variable. It is not an accurate predicator to make clinical assumptions that specific wound types or wound size will define the type of pain the patient is experiencing[14]. Pain in chronic wounds can be either chronic nociceptive or neuropathic background pain, or either acute procedural or neuropathic pain during dressing changes[15]. Pain intensity can vary day to day, be stable over time, and may increase during the night[3].

The measurement of pain is not simple, as pain is complex and multidimensional. Chronic pain requires a multifaceted comprehensive assessment. In order to accurately and effectively manage wound-related pain, Price *et al.*[4] state that assessment should be based on six critical dimensions of the pain experience, being location, duration, intensity, quality, onset and impact on activities on daily living. Pain management should be holistic and must include psychosocial approaches together with local and systemic pain management. The challenge is to select a suitable way to assess pain which is valid, reliable and appropriate to each patient's needs and circumstances.

RATIONALE

To identify and treat pain, an appropriate assessment must be undertaken. There are a multitude of clinical practice

guidelines on the assessment and management of lower limb wounds that state accurate pain assessment is essential for effective management[16-18]. However, there is no tool to specifically assess and measure persistent pain in chronic lower limb wounds. Numerous studies have illustrated the lack of a validated wound pain assessment tool as a significant barrier to the management of pain in patients with chronic wound pain. Furthermore, a study investigating the characteristics of wound pain associated with diabetes-related foot wounds found that clinicians under assess pain prevalence when they are not using a formal pain assessment tool[19].

Pain questionnaires such as the McGill Pain Questionnaire and the Brief Pain Inventory and pain intensity scales are insufficient to measure the specific dimensions of wound-related pain in the lower extremities and the impact it has on function and mobility. Further, intensity scores are less effective for chronic pain as people with chronic pain show little variation in their pain intensity over long periods of time[20]. Therefore, it is necessary to select a tool that can accurately and reliably assess wound-related pain in the lower limb that is multidimensional to determine the quality and psychometric properties of pain and that is clinically relevant in order to optimise pain management. It should also be applicable to any individual and be culturally and cognitively sensitive.

Given the above, it is important to search and appraise the literature systematically in order to provide an up-to-date background of pain assessment tools used for pain in chronic lower limb wounds. This will allow health practitioners to accurately assess pain to make informed decisions regarding appropriate management of wound-related pain. Therefore, the aim of the current study was to undertake a scoping review of the literature to determine if a validated and holistic pain assessment instrument is available for use in the primary care setting to assess wound pain in chronic lower limb wounds; to summarise the evidence and identify the gaps in the existing literature.

REVIEW QUESTIONS

This scoping literature review was undertaken to establish current best practice for the assessment of wound-related pain in chronic lower limb wounds. The specific review questions to be addressed were:

- How is wound-related pain in chronic lower limb wounds assessed?
- How reliable and valid is the measurement of wound-related pain to optimise wound pain management?

METHODS

Peer-reviewed articles published in English were searched through the electronic biomedical databases MEDLINE, CINAHL, EMBASE and PsycINFO. The search strategy was designed using MEDLINE via the platform Ovid and employed the following keywords sensitivity: [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms]. The search was highly sensitive, as it employed OR to combine keywords with appropriate index terms and amendments were made for its use on other databases. Studies included systematic reviews, meta-analyses, randomised controlled trials, and observational and qualitative studies. As chronic wounds have a long history in health, no filter was applied for date. Truncations, quotations and wild cards were used to include plural nouns and phrasal terms (see Appendix).

Abstracts were retrieved for all potentially relevant studies and reviewed. Articles regardless of methodological design were included if: (i) the research outcome was assessment of wound-related pain; (ii) critique or comparison of wound assessment tools; (iii) wound pain assessment tools were utilised; and (iv) full text was available. Full text studies that described either the validation or appraisal of any of the potentially relevant measures specifically for wound-related pain in chronic lower limb wounds were considered for inclusion of this review. A mixture of qualitative, quantitative and review papers were found. No specific quality critiquing tools were utilised although a commentary on the quality of the articles is provided in the study results. Figure 1 denotes the scoping review article selection process.

RESULTS

The search strategy yielded 1664 potential relevant studies, after screening of titles, and abstracts, 11 full text studies were retrieved for inclusion and review. Of these studies, a total of four articles met the inclusion criteria for this review[9,17,21]. The study characteristics and the identified assessment instruments used for pain assessment are described briefly in Table 1. The literature reviewed identified two categories of pain assessment tools, being quantitative measuring pain intensity and qualitative evaluating the effects of pain on quality of life.

No specific wound-related pain assessment tool was found. However, four main assessment tools emerged from the review, being the Visual Analogue Scale (VAS), the Numerical Rating Scale (NRS), the Verbal Rating Scale (VRS) and the Short Form-McGill Pain Questionnaire (SF-MPQ). The three quantitative tools, VAS, NRS and VRS and one multidimensional tool, the SF-MPQ, which has both qualitative and quantitative components, were nominated as appropriate pain assessment tools for chronic wounds that cover a diverse population and wound type. The NRS and the SF-MPQ were deliberated in all four studies, and the VAS in three studies. Although Newbern[9] reviewed 11 pain assessment instruments which included the SF-MPQ and the NRS, no tool was identified as being an appropriate validated wound pain assessment tool for patients experiencing diabetic foot ulcers or chronic lower extremity wounds.

ANALYSIS

Overall, the methodologies in these papers were heterogeneous, particularly with regard to the choice of pain assessment tools. Newbern[9] conducted an integrative literature review that focused on factors in primary care that affect the assessment of pain and quality of life related to chronic wounds secondary to lower extremity vascular disease. It included a search for current pain assessment practices and instruments used for evaluating and treating lower extremity chronic wound pain. Although it identified 11 pain assessment instruments, no critique of the tools was provided, but concluded that there is a lack of validated pain and quality assessment tools specifically for chronic lower leg wounds and diabetic foot ulcers. Similarly, Solowiej *et al.*[21] conducted a literature review which focused on the psychological impact of pain during wound healing, the aim was to identify pain measurement tools and psychological measures of stress. This paper provided a simple overview of the four most common pain measurement tools identified in the literature and briefly discussed the strengths and weaknesses of use in clinical practice. There was no clear criteria or critique discussed to determine why the tools were chosen.

Likewise, Woo *et al.*[22] conducted a literature review on the assessment and management of persistent chronic and total pain to develop recommendations and statements for assessing and managing wound pain. The authors found a wide array of standardised and validated tools to measure pain intensity and assess pain characteristics. Four quantitative pain assessment tools and one multidimensional tool, which included quantitative and qualitative components, were chosen as the recommended tools. It should be noted that the authors categorised the assessment tools as either "quantitative", being the NRS and VAS, or "qualitative and

Table 1: Study characteristics of our included articles

Authors	Design	Purpose	Type of wound pain	Pain assessment tool reviewed for application to wound-related pain	Outcome	Recommended assessment tool
1.Nemeth *et al.* (2003)	Critical appraisal	To identify and compare psychometric, clinical sensibility, and pain-specific properties of pain assessment tools for leg ulcers	Chronic	Pain Ruler, NRS, VAS, VRS, SF-MPQ	Insufficient evidence to recommend any one pain assessment tool	Nil; however, a 2-step pain assessment for presence and level of pain (NRS) and quality of pain (McGill Pain Questionnaire)
2. Newbern (2018)	Literature review	To identify gaps in pain identification and assessment of patients with chronic wounds related to lower extremity vascular disease	Chronic	11 pain assessment instruments identified, which included SF-MPQ and Numeric Pain Scale	Lack of validated pain and QoL assessment tools for chronic lower extremity wounds	Nil
3.Solowiej *et al.* (2010)	Literature review	To review tools available for the assessment and measurement of patients' stress and pain	Chronic, wound dressing changes	McGill Pain Questionnaire, VRS, NRS, VAS	Identified the strengths and weaknesses of use in clinical practice	Nil
4.Woo *et al.* (2008)	Literature review	To provide recommendations and statements for assessing and managing wound-related pain developed for health care professionals and policy makers	Chronic	VAS, NRS, VRS, Faces Scales, SF-MPQ	Regardless of tool selected, the same rating scale should be used sequentially	Nil, selection is based on age, language, educational level, sensory impairment or cognitive status

SF-MPQ= Short Form McGill Pain Questionnaire, VAS= Visual Analogue Scale, NRS = Numerical Rating Scale, VRS = Verbal Rating Scale.

pain characteristics tool", being the VRS, Faces Scale and SF-MPQ. Similar to the other two studies, no critique was conducted for the selection.

In contrast to the previous discussed studies, Nemeth *et al.*[17] conducted a search and appraisal of pain assessment tools specifically for measurement of leg ulcer pain. The appraisal criteria assessed the psychometric properties, clinical relevance, pain-specific identification and suitability for use with individuals with leg ulcers. Despite identifying five assessment tools that met the criteria, their findings indicated that there is insufficient evidence to recommend any one pain assessment tool.

DISCUSSION

Four studies met the study inclusion criteria and were further reviewed. From these, four common generic pain assessment tools, the NRS, VAS, VRS and SF-MPQ, were justified to offer pain assessment tools that could be useful for leg ulcer[17,22]. All studies stated that although there are several pain assessment tools there is no evidence to indicate that any of the four tools have been specifically evaluated psychometrically with chronic lower limb wounds.

Numerical Rating Scale (NRS)

The NRS is a unidimensional tool that measures pain intensity on an 11-point (0–10) scale. The patient is asked to select the number on the scale that most accurately describes their pain. The NRS is a simple, quick and easy tool to administer and is the tool of choice for most individuals, even in the presence of cognitive impairment[21,22]; however, Nemeth *et al.*[17] report no literature was found commenting on its ease of use by clinicians. One of the weaknesses of use in clinical practice outlined by Solowiej *et al*.[21] is that when taking measurements over time patients' previous ratings may influence their reports on current pain intensity. Extensive research has been conducted on this tool, concluding it to be the instrument of choice in mixed populations, patients with chronic pain as well as patients with head and neck cancer[23]. Its ability to be utilised through both verbal and written methods differentiates it from the VAS[24].

Visual Analogue Scale (VAS)

The VAS is a widely used unidimensional instrument which specifically measures pain intensity[25] and has been validated in its use in both acute and chronic pain. The scale is a horizontal 100 mm line anchored by words at each end of the scale, indicating extremes of what is being measured. The scale requires the patient to indicate the intensity of their pain by placing a cross on the scale between 0 (no pain) and 100 (severe pain) or shifting a moveable cursor along a 100 mm line.

High correlations have been found between a mechanical VAS of using the cursor and the traditional VAS drawing a cross on the scale[23]. Cut-off points and minimal clinically important difference have been determined for VAS in individuals with rheumatoid arthritis, rotator cuff disease, non-surgical temporomandibular pain, post-surgical patients as well as hip and knee osteoarthritis[26-31]. The World Union of Wound Healing Societies' consensus recommends 40 mm and above to be indicative of moderate wound pain and

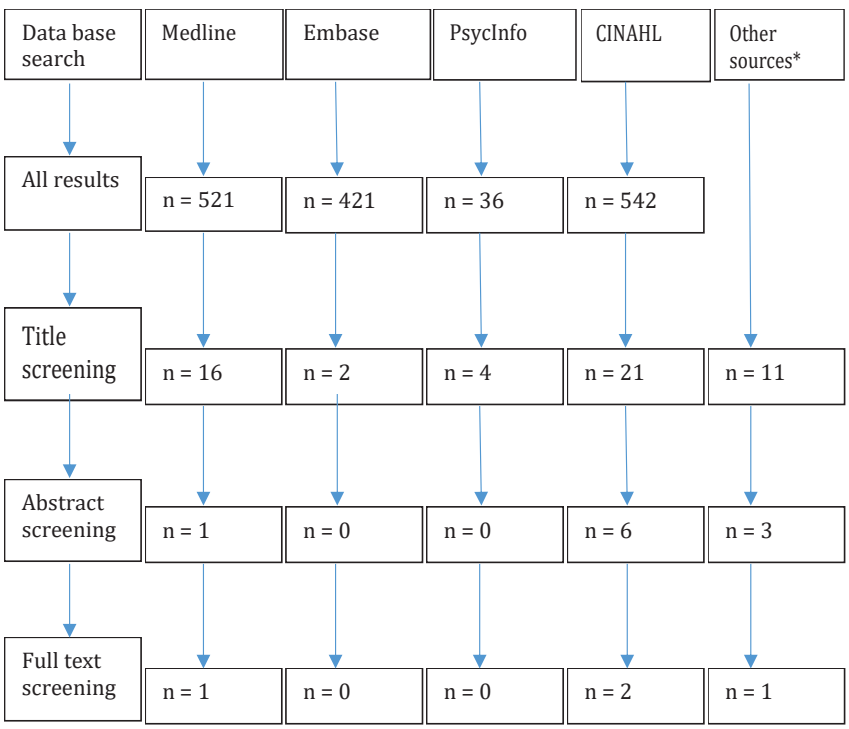

Figure 1: Searching and screening processes
**Other included reference chasing, websites and snowballing sampling*

there is some evidence that cut-off points vary with pain aetiology[32,33].

Like the NRS, it is a quick and easy tool to administer[21,22] and patients are less likely to be able to recall the score they previously drew on the scale. Nemeth *et al.*[17], however, state that clinicians do not consider it easy to use because of the explicit instruction that must be followed during the administration and the pain score transcription which is required to be measured to obtain a score. Some evidence indicates that in contrast to the NRS, it may not be suitable for some older people because of conceptual concepts in understanding and using the VAS[17,21].

Although pain intensity tools such as the NRS and VAS are commonly used, intensity scores are less effective for chronic pain as people with chronic pain show little variation in their pain intensity over long periods of time[20].

Verbal Rating Scale (VRS)

Verbal rating scales have been shown to be particularly appropriate for use in the self-report of pain intensity by older people[34]. Patients are asked to choose the words that best describes their pain on a 4- to 5-point verbal rating scale, ranging from 'no pain' to 'very severe pain'. The VRS has demonstrated adequate face, concurrent, convergent and criterion validity[35-37]. Due to a reduced number of responses compared to the VAS or NRS, it has been found less sensitive to detecting pain intensity changes[38,39]. The VRS was the patient-preferred pain instrument of choice in less educated and older populations[23]. Low error rates compared to the VAS and NRS were found for both cognitively intact and cognitively impaired older adults[35,40]. High internal consistency and sufficient test-retest reliability have also been established[36,41]. The cross-cultural validity of VRS is deemed questionable due to translation of descriptors into other languages[42].

The VRS is a quantitative tool which is generally considered as measuring only pain intensity; however, Woo *et al.*[22,p.208] categorised it as a "qualitative and pain characteristic tool". As the scale is relatively short, it is not sensitive or able to detect changes in pain intensity[17,21]. One of the weaknesses is that when taking a series of measurements over a period of time, patients may be able to recall the previous descriptor and therefore it may not be a true reflection of their current pain[21].

The McGill Pain Questionnaire (MPQ)

The MPQ is the most widely used multidimensional instrument. Designed to quantitatively and qualitatively measure the complex phenomenon of pain, it was developed to measure both pain intensity and quality[43]. Melzack and Torgerson proposed pain was not purely a sensory experience but also involved both affective and evaluative qualities[44].

The original MPQ contained 20 subclasses of word descriptors which represented a particular sensory, affective, evaluative or miscellaneous pain quality. The respondent selects one word from each subclass to best represent their subjective pain experience. Each descriptor is provided with a value in its group based on pain intensity. The Short Form-McGill Pain Questionnaire (SF-MPQ) was developed to reduce the time to complete the questionnaire. It comprises of a 15-word descriptor list which measures quality of pain and provides outcome measures of sensory and affective present pain intensity and includes a VAS which measures overall pain intensity[45].

The SF-MPQ is reported to have high internal consistency, adequate test-retest reliability with good content validity[46]. Numerous studies have suggested the SF-MPQ to be the preferred choice in a clinical research environment[25,46]. It has been validated for many types of pain, including adults with chronic pain[25,46].

Woo *et al.*[22] describe the SF-MPQ as a good tool to capture the quality and characteristics of pain. It differentiates neuropathic pain from nociceptive pain and is a popular choice for clinicians. Likewise, Solowiej *et al.*[21] acknowledges the questionnaires strength for use in clinical practice is the ability to provide information on the sensory, affective and evaluative dimensions of pain and the sensitivity to changes in pain report. However, the different scoring systems may be potentially unwieldy for practitioners and the scores may be subject to a patient's misunderstanding of instructions. Nemeth *et al.*[17] also argued that the SF-MPQ may not be easy to use because of the VAS and the interpretation of the pain descriptor words, yet research by developers of the MPQ indicate that patients, including the elderly, do not have any difficulty[45].

Further to the common tools discussed, there is a vast array of pain measurement instruments which are predominately used for outcome measures in clinical research studies on wound pain. Generally, these studies use a combination of two measurement tools to evaluate the multiple dimensions of acute and chronic pain. The SF-MPQ is one of the most common tools used for research purposes in combination with an intensity pain scale such as the NRS VAS or VRS. Other pain instruments commonly cited in the wound pain literature were the Diabetes Foot Ulcer Scale, Short SF-12, and Brief Pain Inventory. While all these tools are validated to measure both acute and chronic pain, they have not been specifically validated for lower limb wound pain.

LIMITATION

The scope of this review has several limitations that should be considered. First, the review was limited by the relatively small number of relevant articles eligible for the analysis. Second, the searches were limited to studies published in English, which potentially excluded relevant articles published in other languages. Finally, the intent of a scoping review was not to evaluate the quality of the evidence but to provide an overview and conclusions based on the existence of studies on wound pain assessment of the lower limb and to identify potential research gaps.

CONCLUSION

There are multiple pain assessment tools available and each tool has its own strengths and weaknesses. This review identified four articles that evaluated pain assessment tools that could be used for wound-related pain. Although four common pain measurement tools were identified to be suitable for wound pain, current evidence is insufficient to recommend one pain assessment tool that is suitable for chronic lower limb wounds.

In order to effectively manage wound pain, a reliable and valid pain assessment tool is needed.

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CONFLICT OF INTEREST

The author declares no conflict of interest.

FUNDING

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APPENDIX: Search strategy

Table 1: Ovid MEDLINE (R) 1946 – 2 June 2018

#	Searches
1	(wound* or ulcer* or 'coloni?* wound*' or 'contamin* wound*' or 'infect* wound*' or 'coloni?* ulcer*' or 'contamin* ulcer*' or 'infect* ulcer*').mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms] (536383)
2	"Wounds and Injuries"/ (71969)
3	1 and 2 (71969)
4	1 or 3 (536383)
5	(pain* or 'chronic pain' or 'persistent pain' or 'long-term pain' or 'continuous pain' or 'background pain' or 'neuropathic pain' or 'pain perception' or 'wound related pain' or 'ulcer related pain').mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms] (604850)
6	Chronic Pain/ (9969)
7	Nociceptive Pain/ (579)
8	6 or 7 (10499)
9	5 and 8 (10499)
10	5 or 8 (604850)
11	('lower extremit*' or 'lower limb*' or leg or ankle* or foot or feet or toe* or forefoot or forefeet or heel or metatars* or hallux or 'below knee*').mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms] (339389)
12	Lower Extremity/ (14932)
13	11 or 12 (339389)
14	('assessment tool*' or 'pain tool*' or 'pain assessment tool*' or 'pain measurement*' or 'pain measurement tool*' or 'pain scale*' or 'pain instrument*' or 'pain questionnaire' or 'pain rating scale*' or evaluat* or 'check list questionnaire' or appraisal* or chart* or indicat* or survey* or 'pain diary' or 'self report').mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier, synonyms] (5750581)
15	Nursing Assessment/or Pain Measurement/or "Surveys and Questionnaires"/ (492385)
16	14 or 15 (5770329)
17	4 and 10 and 13 and 16 (2122)
18	limit 17 to (English language and humans (clinical trial, all or meta-analysis or observational study or randomized controlled trial or systematic reviews or validation studies)) (521)

Table 2: EMBASE 1974 – 2 June 2018

#	Searches
1	(wound* or ulcer* or 'coloni?* wound*' or 'contamin* wound*' or 'infect* wound*' or 'coloni?* ulcer*' or 'contamin* ulcer*' or 'infect* ulcer*').mp. [mp=title, abstract, heading word, drug trade name, name of substance word, original title, device manufacturer, device trade name, keyword, floating subheading, candidate term word] (646214)
2	"Wounds and Injuries"/ (135736)
3	1 and 2 (13345)
4	1 or 3 (646214)
5	(pain* or 'chronic pain' or 'persistent pain' or 'long-term pain' or 'continuous pain' or 'background pain' or 'neuropathic pain' or 'pain perception' or 'wound related pain' or 'ulcer related pain').mp. [mp=title, abstract, heading word, drug trade name, name of substance word, original title, device manufacturer, device trade name, keyword, floating subheading, candidate term word] (1174392)
6	Chronic Pain/ (51012)
7	Nociceptive Pain/ (1201)
8	6 or 7 (51880)
9	5 and 8 (51880)
10	5 or 8 (1174392)
11	('lower extremit*' or 'lower limb*' or leg or ankle* or foot or feet or toe* or forefoot or forefeet or heel or metatars* or hallux or 'below knee*').mp. [mp=title, abstract, heading word, drug trade name, name of substance word, original title, device manufacturer, device trade name, keyword, floating subheading, candidate term word] (516719)

12 Lower Extremity/ (7631)

13 11 or 12 (516719)

14 ('assessment tool*' or 'pain tool*' or 'pain assessment tool*' or 'pain measurement*' or 'pain measurement tool*' or 'pain scale*' or 'pain instrument*' or 'pain questionnaire' or 'pain rating scale*' or evaluat* or 'check list questionnaire' or appraisal* or chart* or indicat* or survey* or 'pain diary' or 'self report').mp. [mp=title, abstract, heading word, drug trade name, name of substance word, original title, device manufacturer, device trade name, keyword, floating subheading, candidate term word] (8562907)

15 Nursing Assessment/or Pain Measurement/or "Surveys and Questionnaires"/ (608929)

16 14 or 15 (8814717)

17 4 and 10 and 13 and 16 (4446)

18 limit 17 to (English language and humans (clinical trial, all or meta-analysis or observational study or randomized controlled trial or systematic reviews or validation studies)) [Limit not valid in EMBASE; records were retained] (421)

Table 3: PsycINFO 1806 – 2 June 2018

#	Searches
1	(wound* or ulcer* or 'coloni?* wound*' or 'contamin* wound*' or 'infect* wound*' or 'coloni?* ulcer*' or 'contamin* ulcer*' or 'infect* ulcer*').mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests and measures] (9923)
2	"Wounds and Injuries"/ (0)
3	1 and 2 (0)
4	1 or 3 (9923)
5	(pain* or 'chronic pain' or 'persistent pain' or 'long-term pain' or 'continuous pain' or 'background pain' or 'neuropathic pain' or 'pain perception' or 'wound related pain' or 'ulcer related pain').mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests and measures] (107357)
6	Chronic Pain/ (12136)
7	Nociceptive Pain/ (0)
8	6 or 7 (12136)
9	5 and 8 (12136)
10	5 or 8 (107357)
11	('lower extremit*' or 'lower limb*' or leg or ankle* or foot or feet or toe* or forefoot or forefeet or heel or metatars* or hallux or 'below knee*').mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests and measures] (23875)
12	Lower Extremity/ (0)
13	11 or 12 (23875)
14	('assessment tool*' or 'pain tool*' or 'pain assessment tool*' or 'pain measurement*' or 'pain measurement tool*' or 'pain scale*' or 'pain instrument*' or 'pain questionnaire' or 'pain rating scale*' or evaluat* or 'check list questionnaire' or appraisal* or chart* or indicat* or survey* or 'pain diary' or 'self report').mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests and measures] (1321974)
15	Nursing Assessment/or Pain Measurement/or "Surveys and Questionnaires"/ (1320)
16	14 or 15 (1321974)
17	4 and 10 and 13 and 16 (36)
18	limit 17 to (English language and humans) [Limit not valid in PsycINFO; records were retained] (36)

Table 4: AMED 1985 – 2 June 2018

#	Searches
1	(wound* or ulcer* or 'coloni?* wound*' or 'contamin* wound*' or 'infect* wound*' or 'coloni?* ulcer*' or 'contamin* ulcer*' or 'infect* ulcer*').mp. [mp=title, abstract, heading words, title] (4897)
2	"Wounds and Injuries"/ (252)
3	1 and 2 (252)
4	1 or 3 (5897)
5	(pain* or 'chronic pain' or 'persistent pain' or 'long-term pain' or 'continuous pain' or 'background pain' or 'neuropathic pain' or 'pain perception' or 'wound related pain' or 'ulcer related pain').mp. [mp=title, abstract, heading words, title] (31071)
6	Chronic Pain/ (0)
7	Nociceptive Pain/ (20)
8	6 or 7 (20)
9	5 and 8 (20)
10	5 or 8 (31071)
11	('lower extremit*' or 'lower limb*' or leg or ankle* or foot or feet or toe* or forefoot or forefeet or heel or metatars* or hallux or 'below knee*').mp. [mp=title, abstract, heading words, title] (26972)
12	Lower Extremity/ (0)
13	11 or 12 (26972)
14	('assessment tool*' or 'pain tool*' or 'pain assessment tool*' or 'pain measurement*' or 'pain measurement tool*' or 'pain scale*' or 'pain instrument*' or 'pain questionnaire' or 'pain rating scale*' or evaluat* or 'check list questionnaire' or appraisal* or chart* or indicat* or survey* or 'pain diary' or 'self report').mp. [mp=title, abstract, heading words, title] (68500)
15	Nursing Assessment/or Pain Measurement/or "Surveys and Questionnaires"/ (1593)
16	14 or 15 (68500)
17	4 and 10 and 13 and 16 (117)
18	limit 17 to (English language and humans) [Limit not valid; records were retained] (111)

Table 5: Health and Psychosocial Instruments 1985 – 2 June 2018

#	Searches
1	(wound* or ulcer* or 'coloni?* wound*' or 'contamin*

wound*' or 'infect* wound*' or 'coloni?* ulcer*' or 'contamin* ulcer*' or 'infect* ulcer*').mp. [mp=acronym, descriptors, measure descriptors, sample descriptors, abstract, source] (855)

2 "Wounds and Injuries"/ (0)

3 1 and 2 (0)

4 1 or 3 (855)

5 (pain* or 'chronic pain' or 'persistent pain' or 'long-term pain' or 'continuous pain' or 'background pain' or 'neuropathic pain' or 'pain perception' or 'wound related pain' or 'ulcer related pain').mp. [mp=acronym, descriptors, measure descriptors, sample descriptors, abstract, source] (8784)

6 Chronic Pain/ (0)

7 Nociceptive Pain/ (0)

8 6 or 7 (0)

9 5 and 8 (0)

10 5 or 8 (8784)

11 ('lower extremit*' or 'lower limb*' or leg or ankle* or foot or feet or toe* or forefoot or forefeet or heel or metatars* or hallux or 'below knee*').mp. [mp=acronym, descriptors, measure descriptors, sample descriptors, abstract, source] (426)

12 Lower Extremity/ (0)

13 11 or 12 (426)

14 ('assessment tool*' or 'pain tool*' or 'pain assessment tool*' or 'pain measurement*' or 'pain measurement tool*' or 'pain scale*' or 'pain instrument*' or 'pain questionnaire' or 'pain rating scale*' or evaluat* or 'check list questionnaire' or appraisal* or chart* or indicat* or survey* or 'pain diary' or 'self report').mp. [mp=acronym, descriptors, measure descriptors, sample descriptors, abstract, source] (31270)

15 Nursing Assessment/or Pain Measurement/or "Surveys and Questionnaires"/ (0)

16 14 or 15 (31270)

17 4 and 10 and 13 and 16 (2)

18 limit 17 to (English language and humans) [Limit not valid; records were retained] (2)

Table 6: CINAHL 1981 – 2 June 2018 (EBSCOhost)

#	Searches
1	MH pain assessment tools OR MH pain scale OR MH (pain tool or pain scale or pain assessment) OR MH pain instrument OR MH pain questionnaire OR MH pain rating scale OR MH pain rating OR MH pain evaluation OR MH pain chart OR MH pain index OR MH pain survey OR MH pain diary (292)
2	pain assessment tools OR pain scale OR (pain measurement or pain assessment) OR pain rating scale OR pain questionnaire OR pain survey (37,062)
3	MW ((pain* or 'chronic pain' or 'persistent pain' or 'long-term pain' or 'continuous pain' or 'background pain' or 'neuropathic pain' or 'pain perception' or 'wound related pain' or 'ulcer related pain')) OR TI ((pain* or 'chronic pain' or 'persistent pain' or 'long-term pain' or 'continuous pain' or 'background pain' or 'neuropathic pain' or 'pain perception' or 'wound related pain' or 'ulcer related pain')) OR AB ((pain* or 'chronic pain' or 'persistent pain' or 'long-term pain' or 'continuous pain' or 'background pain' or 'neuropathic pain' or 'pain perception' or 'wound related pain' or 'ulcer related pain')) (171,646)
4	MW (('lower extremit*' or 'lower limb*' or leg or ankle* or foot or feet or toe* or forefoot or forefeet or heel or metatars* or hallux or 'below knee*')) OR AB (('lower extremit*' or 'lower limb*' or leg or ankle* or foot or feet or toe* or forefoot or forefeet or heel or metatars* or hallux or 'below knee*')) OR TI (('lower extremit*' or 'lower limb*' or leg or ankle* or foot or feet or toe* or forefoot or forefeet or heel or metatars* or hallux or 'below knee*')) (75,187)
5	lower extremity (13,638)
6	MW (('assessment tool*' or 'pain tool*' or 'pain assessment tool*' or 'pain measurement*' or 'pain measurement tool*' or 'pain scale*' or 'pain instrument*' or 'pain questionnaire' or 'pain rating scale*' or evaluat* or 'check list questionnaire' or appraisal* or chart* or indicat* or survey* or 'pain diary' or 'self report')) OR TI (('assessment tool*' or 'pain tool*' or 'pain assessment tool*' or 'pain measurement*' or 'pain measurement tool*' or 'pain scale*' or 'pain instrument*' or 'pain questionnaire' or 'pain rating scale*' or evaluat* or 'check list questionnaire' or appraisal* or chart* or indicat* or survey* or 'pain diary' or 'self report')) OR AB (('assessment tool*' or 'pain tool*' or 'pain assessment tool*' or 'pain measurement*' or 'pain measurement tool*' or 'pain scale*' or 'pain instrument*' or 'pain questionnaire' or 'pain rating scale*' or evaluat* or 'check list questionnaire' or appraisal* or chart* or indicat* or survey* or 'pain diary' or 'self report'))(937,204)
7	Nursing Assessment/or Pain Measurement/or "Surveys and Questionnaires"/ (47,550)
8	MH (wounds and injuries) OR MH venous leg ulcers OR MH pressure ulcer OR MH diabetic foot ulcer OR MH ischaemic ulcers (10,761)
9	(MH "Wounds, Chronic") OR (MH "Wounds, Penetrating") OR (MH "Wounds and Injuries") OR (MH "Surgical Wound Dehiscence") (19,202)
10	wound* OR ulcer* (83,768)
11	S8 OR S9 OR S10 (83,768)
12	(MH "Pain+") OR (MH "Nociceptive Pain") OR (MH "Chronic Pain") OR (MH "Neuropathic Pain") (118,895)
13	S3 OR S12 (183,414)
14	S6 OR S7 (948,314)
15	S4 OR S5 (75,187)
16	S1 OR S2 OR S6 OR S7 (949,126)
17	S11 AND S13 AND S15 AND S16 Limiters — English Language; Human (542)

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