Which methods of assessment are currently used in wound assessment tools to assess wound odour? A scoping Review

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ABSTRACT

Background Wound-related odour has a negative impact on the quality of life of the patient and may be indicative of wound infection or deterioration. Wound assessment should incorporate odour assessment. This scoping review aimed to determine what wound odour assessment methods are incorporated into wound assessment tools.

Methods This review was guided by the Joanna Briggs Institute recommendations for the conduct of scoping reviews and reported according to the PRISMA-ScR checklist.

Results Five methods to assess wound odour used in wound assessment tools were identified: TELER; TSAW-W; WoSSAC; MWAT-C & R; and the National Wound Assessment Form. Each reported on the process of tool development with evidence of validity and reliability testing at the development stage. However, these tools were very poorly represented in research studies that aimed to evaluate the outcomes of interventions to manage odour.

Conclusions Validated methods of wound-related odour assessment do exist but are poorly represented in wound assessment tools or research studies. Numeric rating scales of odour intensity are the most frequently reported but do not take account of the level of interference or 'bother' for the patient or their families. We need a call to action for industry and the research community to recognise the significance of this problem and to work together to find solutions that are tested using validated tools.

KEY MESSAGES

- Wound-associated odour has a negative effect on the quality of life of the patient and their families.
- Methods to assess wound odour are well developed but poorly used.

- Rather than develop new wound odour assessment tools we need to use those that are already tested for validity and reliability and incorporate them into clinical practice and research.
- There is a critical need to increase the importance of screening for, and assessing wound-related odour as this is currently lacking in wound assessment tools.

INTRODUCTION

Chronic wounds have been defined as wounds that do not follow a normal healing trajectory and do not heal in a time that should normally be sufficient for resolution.[1] These wounds generally affect the adult population, particularly the elderly, and are quite heterogeneous in their aetiology, pathogenesis and approach to treatments.[2] Chronic wounds pose a substantial economic burden to healthcare providers and wider society. The extent and cost of treating chronic wounds is not fully known but current evidence would suggest that chronic wounds may affect up to 5% of the adult population and consume up to 10% of health care expenditure.[2]

The consequences of a wound can include pain associated with the wound, bleeding, wound exudate and wound odour (or malodour), as well as other social, physical, or psychosocial impacts.[1,3] Living with a chronic, non-healing wound, can contribute to depression and anxiety, both of which are associated with more somatic complaints, including impaired social functioning, social isolation, self-image changes, lower self-esteem, feelings of embarrassment, hopelessness and lower health-related quality of life.[1, 4, 5]

Of all wound-related symptoms, wound-related odour is reported as one of the most unpleasant and distressing symptoms by patients, carers, and clinicians.[3] Patients "become resigned to living with wound-related odour"[3] and use evocative language to describe wound odour including "so bad", "terrible", "very smelly", "sickly disgusting smell", "putrid" and "foul". Others compared their wound odour to "rotten meat", and "rotten flesh" and reported this as "nauseating".[3, 4]

Wound malodour generally arises due to ischaemia with subsequent degradation of wound tissue, bacterial colonisation or fungal infection in the wound, or a combination of these.[6] The severity of wound odour is associated with the types of colonising micro-organisms, including aerobic and anaerobic bacteria, which are known to produce malodorous metabolic end products.[6] It is these aerobic–anaerobic synergistic interactions that play a key role in facilitating malodour production.[6]

Reducing odour from a wound has the potential to eliminate patients' feelings of embarrassment, shame, guilt, repulsion, and distress, and can help to improve their quality of life, self-esteem, and body image.[7] Controlling wound odour, therefore, must be a key goal of management for all clinicians involved in treating malodourous wounds.[7] Yet, while clinicians acknowledge odour as being one of the most distressing wound symptoms, it has been found that only 12% of healthcare professionals assess odour in routine practice.[8] While feasible to undertake more reproducible, objective assessments, for instance, using olfactometer, gas chromatography separation coupled with a mass spectrometer detector analysis and/or more subjectively Sniffin's Sticks tests, such tests may not be readily available or suitable, for routine use in practice.[4]

The problem of wound odour extends across wound aetiologies and remains an under researched, poorly understood and poorly managed phenomenon.[7] While best practice in wound assessment advocates for assessment of odour there is no current consensus on methods of assessing wound odour.[4,7] Tools that are currently used in practice are subjective, mainly using scales in numeric format to assesses odour intensity or distance from the wound when odour is detected. To date, research and evidence has focused on the management of wound odour rather than effective assessment strategies or tools that can assist health professionals and patients in early recognition of odour.[8] In addition to impacting on patient care, the lack of consensus on a preferred method to assess odour also negatively impacts the internal and external validity of many clinical trials and minimises the ability to perform meta-analysis.[4,9] This lack of consensus underscores the need to map the body of literature and synthesise the evidence base to determine what tools are used in practice to assess odour.

Primary review question:

- Which methods of assessment, validated or otherwise are currently used in wound assessment tools to assess wound odour?

Secondary questions:

- What patient (wound) population is the tool designed for?
- Is the tool designed for use by specific individuals, for example clinicians only?
- Is there evidence of the tool being validated?
- Are the results of the assessment included in an overall wound score?

The objective of this scoping review is to map the methods used to assess wound odour as they are presented in wound assessment tools, regardless of wound aetiology or the stakeholder group to which the tool applies?

METHODS

Protocol and registration

This scoping review was conducted in accordance with the Joanna Briggs Institute (JBI) methodology for scoping reviews and guided by the Arksey and O'Malley framework with revisions by Levac.[10] A detailed review protocol has been published[4] with the main elements summarised in the sections below. It is reported according to the Preferred Reporting Items for Systematic Reviews and Meta-Analysis extension for Scoping Reviews (PRISMA -ScR) checklist.[11]

Eligibility criteria

The population, concept, context (PCC) framework[12] was used to identify the concepts studied and create the eligibility criteria as follows:

Population: Literature on patients with odorous wounds, as well as by clinicians assessing odour, was included.

Concept: The review aims to scope the methods, both validated and otherwise, currently used in wound assessment

tools to evaluate wound odour. It focuses on globally applicable assessment tools that provide indications about wound odour.

Context: To broaden the scope of the review, all care settings were included: hospitals, community settings, primary care facilities, and any other environments where wound care was administered, whether privately or publicly. No geographical restrictions were applied. We included full-text publications employing quantitative, qualitative and mixed methods.

Any systematic or scoping review that evaluated wound odour as a primary outcome was deemed eligible with checking of reference lists of included reviews to ensure we did not miss any relevant sources. Also eligible were original reports of wound assessment tool development or validation studies that reported on tools or strategies (validated or otherwise) to assess for odour, or any wound assessment tool, framework, guideline/clinical practice protocol or instrument including an odour assessment component. Method of odour assessment was as reported in the articles and was not limited to odour intensity.

Changes from the protocol

Careful review of all systematic and integrative reviews identified a range of odour assessment tools and approaches to assessment that were not part of a wound assessment 'tool'. We included these in additional tables in our final review in order to be as comprehensive and inclusive as possible.

Information sources

Preliminary searches were conducted in Ovid Medline and EBSCO CINAHL. The text words contained in the titles and abstracts of retrieved relevant articles, and the index terms used to describe the articles, were used to develop a full search strategy using Ovid Medline. This was peer reviewed according to the Peer Review of Electronic Search Strategies (PRESS) guideline and adapted for use in PubMed, Embase, EBSCO CINAHL, Cochrane CENTRAL, LILACS (Latin American and Caribbean health sciences literature) and LiSSa (Health Scientific Literature). BASE (the Bielefeld Academic Search Engine) was used to search for grey literature. There were no limitations on language or date of publication.

The search was conducted in June 2023. No revisions were made to the search strategy.

SEARCH

Selection of sources of evidence

Search results were exported to EndnoteX9™ and were deduplicated. Remaining titles and abstracts were transferred to the Rayyan online screening tool and were deduplicated for a second time.[13] Following a pilot screening exercise, reviewer pairs independently screened titles and abstracts for inclusion against the pre-determined review eligibility criteria. A single failed criterion was considered enough to warrant exclusion although many were excluded on multiple criteria. Discrepancies were resolved by discussion between authors with referral to a third party where necessary. Full text of included titles and abstracts were located and screened for eligibility as described above.

If a full text article could not be located directly, assistance was sought from the full range of library resources available through all review authors, and attempts were made to contact article authors through corresponding author email addresses and through ResearchGate..

Data charting process, data items and synthesis of results

Data were extracted from papers included in this scoping review by two or more reviewers working independently using a review specific data extraction form, as detailed in the protocol.[4] In the case of discrepancies (n=3) a review meeting was held to discuss individual articles. For each of the review questions, primary and secondary questions tables were developed to summarise characteristics and key results. A critical appraisal of the sources of evidence was not conducted.

RESULTS

Search results

2481 titles and abstracts were retrieved from the selected databases as follows: Medline (572), PubMed (519), LiSSa (34), LILACS (60), BASE (319), Central (113), CINAHL (426) and Embase (438). These are represented in the PRISMA flowchart: Figure 1. Following deduplication 1522 were imported to Rayyan. After a second round of deduplication 1335 titles and abstracts remained for screening.

1283 were excluded and 52 were passed forward for full text screening. Two reviewers screened each paper, with a third party being consulted for discrepancies, resulting in 24 papers being included. Of the 52 papers, 28 were excluded for the following reasons with some being excluded based on more than one criteria: unobtainable (n=6), narrative account or literature review (n=12); individual studies not focused on wound or odour assessment (n=6); audit or survey (n=2); abstract of another study (n=2); laboratory study (n=1).

Characteristics of sources of evidence

We identified 14 systematic or integrative reviews[9,14-26] that reported on 60 sources of evidence. The year of publication of the reviews were from 2005 to 2023. The types of evidence source within the systematic or integrative reviews varied depending on the primary outcome of the review but included letters to the editor (n=1), laboratory study (n=1), development of a guideline or protocol (n=2), unclear (n=3), literature review article (n=7), non-comparative clinical trial or cohort study (n=6), case studies either single or a series (n=27) and RCTs (n=13). Evidence sources within the systematic or integrative reviews were published between 1983 and 2019.

Among the articles cited in the systematic/integrative reviews (n=60) only 31 specifically stated the method of odour assessment with the remaining 29 either unclear or not specified. Methods of odour assessment identified included: 4-point descriptive scale (n=5); subjective interpretation by the clinician (n=5); visual analogue scale (VAS) (n=4); Numeric Rating Scale (NRS) 1–10 (n=3); yes/no response (n=3); Baker and Haig method (n=2); verbal rating scale (n=2); with one each for: TELER scale; increase/decrease or no change; increase or decrease; HERs system; OIRS system; Ashford Scale and NRS 1–5 scale.

We identified 15 articles referring to wound assessment tool development or validation studies that included wound odour.[27-41] These were conducted between 1981 and 2012 and all referred to the tools already identified in the systematic/integrative reviews and reference checking as above.

RESULTS OF INDIVIDUAL SOURCES OF EVIDENCE

Primary Outcome Question:

Q1: Which methods of assessment, validated or otherwise, are currently used in wound assessment tools to assess wound odour?

From the 15 assessment tool development or validation studies described above, we identified five wound assessment tools which included odour as one of the items to be assessed. See Table 1. [27, 31, 33, 40, 38]

Secondary Outcome Questions:

Q2: What patient (wound) population is the tool designed for?

Q3: Is the tool designed for use by specific individuals, for example clinicians only?

Q4: Is there evidence of the tool being validated?

Q5: Are the results of the assessment included in an overall wound score?

Results of questions 2–5 are presented in Table 2 with further details on their development processes and evidence of testing for validity or reliability presented below. Additionally, we identified a myriad of tools/methods/formats to specifically assess wound odour that were not linked to an overall wound assessment tool, and these are presented in Table 3.

Summary of wound assessment tools and assessment of validity and reliability

Treatment Evaluation by A Le Roux's Method (TELER). TELER is a generic system for making clinical notes and measuring patient-centered outcomes of treatment and care.[36] It can be applied to any condition or sphere of activity, clinical or non-clinical, where the outcomes of interventions need to be measured over time. TELER was first applied to wound care by Grocott in 1997 using a longitudinal case study approach among patients with malignant fungating wounds.[34, 35, 37] The system has two main elements: clinical note-making and clinical measurement. These assess information regarding the pattern of change or lack thereof, in a patient's condition. This may be coded at the individual patient level (evaluation) and patients can participate in evaluating their own outcomes if they are able to do so. The clinical measurement element collects observational data through the TELER indicator, a numerically formatted ordinal scale of patient outcomes at the point of treatment and care. It records the relationship between the treatment and care given, how it was perceived by the patient and the outcomes in terms of clinically significant change. Outcome measures include patient experiences, symptom management, wound healing, palliative care and dressing use and performance.[33] Validation has been completed among patients with Malignant Fungating Wounds and with epidermolysis bullosa[33-35] with some reports

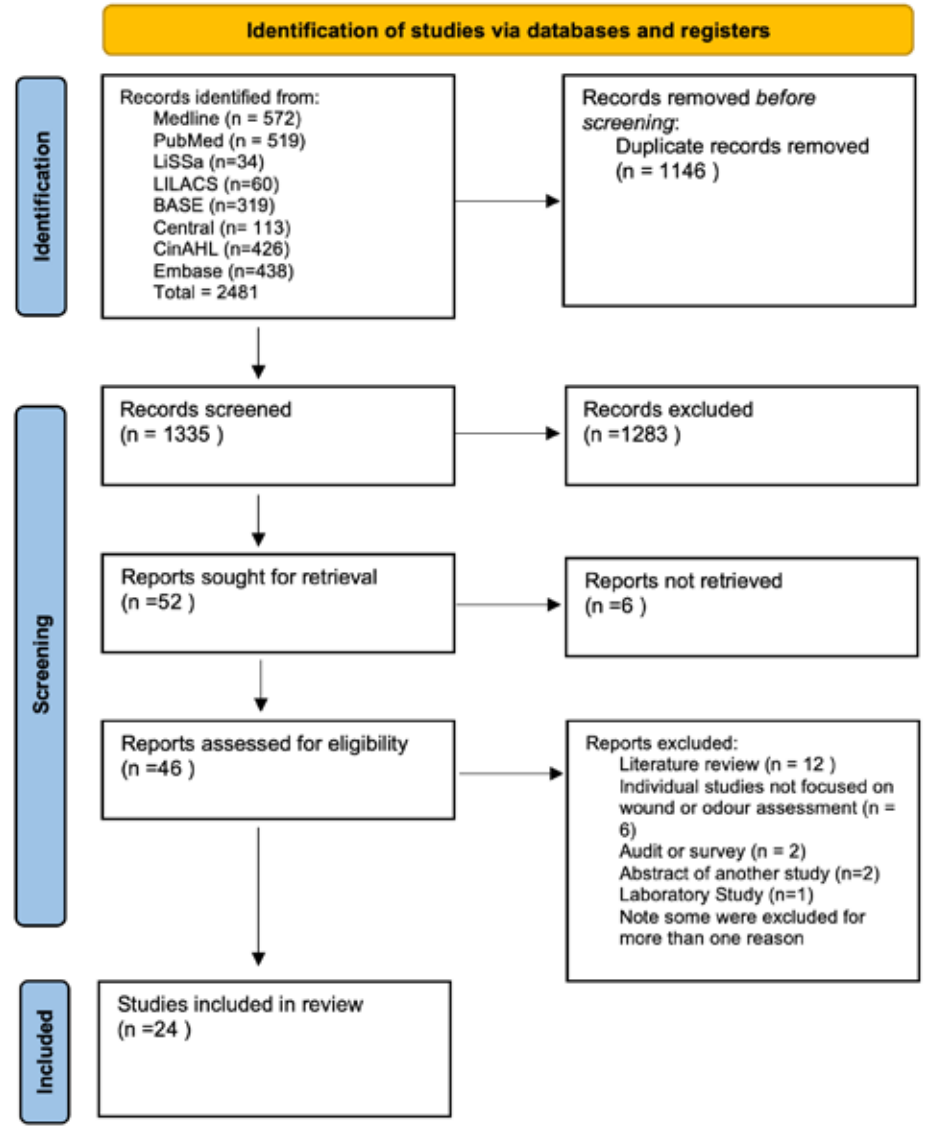

Figure 1. PRISMA Flow Diagram

of use with patients with chronic venous leg ulcers. The system requires a licence for use. It was identified in one systematic review included in this scoping review.

Toronto Symptom Assessment System for Wounds (TSAS-W).[31] This tool was developed in 2008 and followed a stepwise process that included two literature reviews and recording of patient-reported most severe wound related symptoms. This was followed by a pilot trial of the tool among 83 patients. The tool includes 10 items, one of which is odour. The design uses an 11-point numeric rating scale (NRS) in which zero is no odour and 10 is most severe odour. None of the articles in the systematic review included in this scoping review used the TSAS-W.

Wound Symptoms self-assessment chart (WoSSAC) was developed in 2002.[38] The development process involved a literature review, followed by a six-stage process for developing a questionnaire to establish the content and format of the assessment tool. Item selection and item reduction were completed for the questionnaire. As the tool was intended to measure symptom distress, it was decided to evaluate both severity and interference with daily life of each symptom or problem. Both parameters are assessed by patients with reference to the previous seven days. Each item consists of two parts, a lead-in question and a response question. A visual analogue scale (VAS) was chosen for responses to questions on severity. For questions on the level of interference, a five-point Likert scale is used. As the tool

Table 1. Wound assessment tools incorporating odour assessment

Name of tool	Method of assessment	Size of scale if used
TELER (Treatment evaluation by Le Roux method)[33, 34, 37]	Rank order using clinical note taking [odour and odour impacts—patient derived]	3 clinical notes making items 6-point rating scale by clinician conversing with the patient
TSAW-W (Toronto Symptom Assessment System for Wounds[31]	Numeric, 0–10. 0 = no odour 10 = worst possible odour.	11-point scale
WoSSAC (Wound Symptoms self assessment chart) [38]	Visual analogue scale based on the question — what has the smell from your wound been like over the past week? Assesses the severity of the symptom and the level of interference of the symptom	10-point scale
National Wound Assessment Form[27]	Malodour listed as a sign of infection and being present or not. Also asks the question: Does patient report wound odour as a problem yes/no	No scale
Two variations of one tool: Malignant wound assessment tool – clinical (MWAT-C) & Malignant wound assessment tool- Research (MWAS-R)[40, 41]	MWAT-C Do you notice any odour from the wound (describe) ? a) Strong odour evident upon entering room (6–10 feet away from patient), dressing is intact. b) Moderate odour evident upon entering room (6–10 feet) and dressing is removed c) Slight odour evident at close proximity when dressing is removed. d) No odour evident even when at patient's bedside with dressing removed Clinicians descriptions MWAT-R asks: What is the cause of the odour with four response options: a) Sloughy necrotic tissue b) Foul exudate c) Infection d) Other (specify)	No scale

Table 2. Odour assessment tool intended user and validation

Tool	Intended patient or wound aetiology (Q2)	Can patients use this tool? (Q3)	Can clinicians use this tool? (Q3)	Is there evidence of the tool being validated? (Q4)	Are the results included in an overall wound score? (Q5)
TELER	All wounds	Yes, with clinician	Yes	Yes	No
TSAT-W	All wounds	Yes	Yes	Yes	No
WoSSAC	All wounds	Yes, with clinician	Yes, but based on patient responses	No	No
National Tool (NHS)	All wounds	No	Yes	No	No
MWAT	Malignant wounds	Yes, with clinician	Yes	Yes	No

Table 3. Odour assessment tools not part of an overall wound assessment tool

Name	Source reference	Description of scale	Size of scale
American Nursing Association (ANA)	American Nursing Association (ANA)[51]	Numeric and descriptive 1 – Intense 2 – Substantial 3 – Moderate 4 – Scarce 5 – None	5-point scale
American Society for Testing and materials	Odour Intensity Referencing Scale (OIRS)[52]	Numeric and descriptive scale: 1 – No odour 2 – Almost imperceptible 3 – Mild 4 – Moderate 5 – Strong 6 – Very Strong	6-point scale
Ashford et al, 1984	4-point Ashford Scale[53]	Numeric and descriptive: 0 – Absent 1 – Not offensive 2 – Offensive but tolerable 3 – Offensive and intolerable	4-point scale
Baker & Haig, et al, 1981	4-point numerical scale[29]	Numeric and descriptive: 1 – Strong: odour is evident upon entering the room (6 to 10 feet from the patient) with the dressing intact 2 – Moderate: odour is evident upon entering the room with dressing removed 3 – Slight: odour is evident at close proximity to the patient when the dressing is removed 4 – No odour: no odour is evident, even at the patient's bedside with the dressing removed	4-point scale
Bower et al, 1992	Visual analogue scale[14-17]	Numeric and descriptive: 0 – No odour 1–4 – Slight odour 5–8 – Moderate odour 9–10 – Severe odour	11-point scale
Haughton et al, 1995[29]	Odour assessment scoring tool[16, 29]	Verbal Scale: – Strong: odour is evident on entering the room (6-10 feet from the patient) with the dressing intact – Moderate: odour is evident on entering the room (6-10 feet from the patient) with the dressing removed – Slight: odour is evident at close proximity to the patient when the dressing is removed. – No odour: no odour is evident even at the patient's bedside when the dressing is removed.	4-point descriptive scale
Klassen et al, 2021[30]	Patient reported wound odour measure	Verbal: – None – Faint – Moderately strong – Very strong	4-point scale
Nixon Rutherford et al, 2015[32]	Odour subscale within PU QoL	Verbal: During the past week, how much were you bothered by smell or odour from your pressure sore(s)? Six questionnaire items: An unpleasant smell A lingering smell A pungent smell A stench or stink A putrid smell A sickening smell	3 possible answers to each question
Watanbe et al, 2016	5-point numeric scale[18]	Numeric and descriptive: 0 – No smell 1 – Smell present but not offensive, slight smell close to the ulcer about 20cm 2 – Mildly offensive smell, more pronounced smell close to the ulcer about 20cm 3 – Moderately offensive smell, at the bedside about 1m 4 – Extremely offensive smell, at the entrance of the room	5-point scale

was intended for multiple assessments over time a 'symptom evaluation grid' was developed which records the severity and interference scores for each item, including odour. The grid involves calculating the severity by counting the divisions on the VAS and recording this number, to the nearest division. This measurement is then transferred as a score out of 10 to the grid. The authors have reported that work is ongoing for pre-testing and reliability and validity checking but the authors of this scoping review have been unable to identify any published work by those authors to this effect to date. None of the articles in the systematic reviews identified for this scoping review reported using the WoSSAC tool.

The National Wound Assessment Form was developed through a staged process among six wound care experts in the United Kingdom.[27] Of note the article title uses the word 'form' but the text uses both 'form' and 'tool' interchangeably and it is therefore included here. The development process included a review of 33 wound assessment forms. Items within these forms were identified by frequency of occurrence, and then discussed by the panel with further reference to key documents. Once the key criteria and appropriate descriptors were agreed by the panel, consideration was given to presentation of information. The final form was intended for use using digital pen technology so the format was mainly presented using tick boxes. Malodour is listed in two categories. One, as an indicator of infection where the clinician ticks the box if malodour is present, and two, as a question: does the patient report wound odour as a problem with answers as yes or no. We could not find any evidence of this tool being assessed for validity or reliability among clinicians or patients. None of the articles in the systematic reviews identified for this scoping review used this tool.

The Malignant Wound Assessment Tool (MWAT) was developed in 2001 by Schulz.[40] Tool development followed a rigorous process that included: specifying measurement goals, item generation, item reduction, questionnaire formatting and validity of the tool development. It was then tested and validated through a pilot study among 24 patients with cancer and clinician evaluation of the instrument. The tool was later expanded and presented in two formats; one clinical (MWAT-C) and a research format (MWAT-R). The MWAT-R collects more patient-reported information in one of the three sections. The tool(s) assesses five wound-related symptoms, one of which is odour. The odour scale was initially adapted from the Baker & Haig scale.[28] Further validation of the tool has been conducted and includes a Delphi study[41] by the original developer of the tool and validation of MWAT-R using cognitive interviewing among eight patients,[39] leading to revised versions of the original tool. Of note, none of the articles from the systematic reviews identified for this scoping review used either version of the MWAT.

Odour assessment tools independent of a wound assessment tool

A myriad of methods used to assess wound odour were identified from the systematic reviews that formed the basis of this scoping review, as well as from other sources of evidence found through our review of reference lists and knowledge of key documents in wound assessment. To provide as much information as possible to the reader, they are summarised in Table 3.

Of particular note is the scale by Baker and Haig[28] which is referenced throughout the literature. The Baker and Haig tool was later adapted by Haughton and Young and referred to as the Odour Assessment Scoring Tool.[29] Of note, many authors refer to the use of the Haughton and Young tool, but no such tool by that name exists. We identified one paper[42] which aimed to evaluate the validity and reliability of odour assessment candidates among wound care nurses. The study used a step wise approach in which using a two round Delphi study, 19 health care professionals agreed on 'candidate' odour assessment tools. Following this process the Odour Assessment Scoring Tool was recommended as being very practical (36.8% agreed) and practical (63.1% agreed). The Odour Assessment Scoring Tool referred to here was the one by Haughton and Young,[29] adapted from the Baker and Haig tool as described above.[28] Concurrent validity testing to identify the relationship between bacterial burden and level of odour according to the tool showed a positive relationship (R 0.43; p 0.042). Inter-rater reliability between two nurses was tested for the tool and was deemed adequate (R 0.91).

One theme of The Pressure Ulcer Programme of Research (PURPOSE) in the United Kingdom was to focus on patient-reported outcome measures among patients with pressure ulcers.[32] In this programme, patients identified issues that affected their quality of life, one of which included odour. Thus odour assessment was ultimately part of a quality-of-life tool specific to patients with pressure ulcers. Therefore, because it was not part of a wound assessment tool, it was omitted from Table 1 but it is provided for information purpose in Table 3. The authors aimed to develop a patient-reported outcome (PRO) to measure health-related quality-of-life (HRQoL) specific for people with pressure ulcers. Patients who were included in the development process preferred responding to items on odour in terms of how bothered they were about it rather than simply reporting on the frequency. The PU-QoL instrument was designed for interview administration and responses were given in terms of the amount of bother attributed during the past week. Odour had six items: unpleasant; lingering; pungent; stench; putrid; and sickening. We have found no evidence of this tool being used in any of the systematic or integrative reviews identified for this scoping review.

DISCUSSION

Comprehensive wound bed assessment together with patient assessment is the foundation of good wound management. Wound bed assessment is hampered by a lack of objective measurement methods, except for wound size, and thus assessment relies on the expertise and competence of the assessing clinician.[43] There are new imaging and wound sampling technologies being developed to aid wound bed assessment, but they have yet to be evaluated in terms of improved patient outcomes. Additionally, by virtue of the technological format and associated costs they are either not available or not suitable for use in all care settings. Thus, we continue to rely on subjective visual inspection of the wound and assessment of wound-associated symptoms, such as pain and odour.

CONTRIBUTION OF ODOUR TO WOUND ASSESSMENT

A recent systematic review to identify measurement properties of assessment tools for chronic wounds identified 14 tools, all of which we located in our search.[44] Of the 14 tools, only two included assessment of odour: The Sessing Scale and the Leg Ulcer Measurement Tool.[45, 46] In each of these cases odour was incorporated into an assessment of exudate and was not an entity in and of itself. The UK National Wound Assessment Tool (identified in our search) also associated odour with signs of infection and not as a stand-alone symptom,[27] but it did also ask if odour was a problem for the patient. In the review by Smet et al,[44] the five most commonly reported wound parameters were size, depth, wound margins, type of necrotic tissue, and amount/proportion of granulation tissue; with no reference to odour.

Perhaps it is the language that is being used and the interpretation of what constitutes wound assessment that accounts for the poor showing of odour in wound assessment tools. Odour is not visible, is subjective, and therefore cannot be readily quantified and assessed. Furthermore, it is not 'part' of the wound bed and this may account for its exclusion from the tools. However, this argument loses credibility when one considers that pain is almost always included in a wound assessment tool. Pain, like odour, cannot be seen and is subjective. It is concerning therefore that odour is ignored to such a significant extent in tools designed to assess the wound upon which treatment plans are generated. It is important also to consider further the importance of wound odour from a wound healing perspective. Its presence may or may not be associated with poor wound healing but until we first start to assess it correctly we will not know.

SCREENING VERSUS ASSESSMENT

Throughout the articles included in this review, the words screening and assessment were often used interchangeably, but they are two distinct terms and two distinct phases in an assessment process. The purpose of screening is to determine whether an assessment is needed, while the purpose of assessment is to gather detailed information needed for a treatment plan that meets individual needs.[39] It is important to distinguish the two types of questions, so that information can be collected, explored and interpreted properly and usefully.[39] Screening for wound odour can include the terms: present/absent which in turn can lead to a more comprehensive assessment once identified.

The method of odour assessment in the wound assessment tools emphasised impact on the patient and level of interference. The TELER method used clinical note taking based on patient goals; the WoSSAC assessed the severity of the symptom and the level of interferences on a 10-point scale; and the MWAT-C asked if the clinician noted any odour from the wound based on distance from the wound. In contrast, odour assessment in the stand-alone tools was most commonly made in terms of intensity and recorded on NRSs ranging from 0–4 up to 0–100 with higher numbers indicating greater intensity. Some scales further elaborate on the scale by assigning descriptors to the numbers, for example "4=extremely offensive smell, at the entrance to the room".

VALIDITY AND RELIABILITY

Validation of tools used in healthcare is crucial to ensure accuracy, reliability, reproducibility and efficacy in patient care. Validated tools, such as assessment scales, provide a standardised method for evaluating and managing patients, which helps in maintaining consistency and quality across different healthcare settings.[47]

Of the five wound assessment tools identified, it was notable that the majority underwent a robust or strong process of development including consultation and pilot testing. Three had follow up testing for validity and reliability: TELER, TSAW-W, and MWAT-C and MWAT-R.[33-35,39,41,48] It was equally notable that these tools did not prominently feature in the systematic or integrative reviews or in randomised controlled trials (RCTs) of the effectiveness of topical interventions to manage wound odour.[9] These RCTs and other sources of evidence in the systematic review relied heavily on a multitude of numeric scales with different ranges and different meanings assigned to the numbers on the scales.

The tools in which more verbal, patient-focused descriptors were used were the ones with a very rigorous method of development and subsequent validation. Examples include the TELER system and the PU-QoL tool which incorporated wound odour.[32-35,49] These approaches however, while providing an individualised assessment of the impact of odour and how the patients are 'bothered' by odour, do not lend themselves readily to quantitative research on interventions to manage odour and later meta-analysis of such interventions. Perhaps the inability of research, especially meta-analysis, to provide comprehensive, patient-centered wound odour data derived from these robust and validated tools may contribute to a reduced likelihood of effective interventions being taken up by policy makers and those involved in resource allocation.

Any tool for use in wound assessment should be simple to learn and easy to use. When used for research or evaluation they should be valid, reliable, and sensitive to change. They should be validated across wound aetiologies and have broad appeal for implementation, so that clinical outcomes and research data are comparable.[45]

CALL TO ACTION FOR ODOUR ASSESSMENT AND MANAGEMENT

Odour is repeatedly cited by patients and clinicians as one of the most distressing wound-associated symptoms negatively impacting the quality of life of patients and their families.[3,32] Interventions to manage wound-related odour are limited and, according to clinicians and patients, not very effective.[3, 9] Current tools often lack evidence of rigorous methods in their development and are poorly tested for validity and reliability. Thus, a problem of significance to patients, their families, and to clinicians, is poorly recognised, poorly assessed and poorly treated. This must be a call to action for industry and researchers to prioritise this issue and find solutions which can ultimately improve the lives of those impacted by wounds.

LIMITATIONS

It is possible that we have missed some wound assessment tools in the literature but the extensive literature search together with detailed review of all included articles and an in-depth knowledge of the subject area has minimised this

potential. Four of the five final tools identified were repeated throughout the literature, underscoring the widespread knowledge of their use. However, as noted previously, they were not well represented in research studies to evaluate the effectiveness of odour reduction interventions.[9] We acknowledge also that some work that has been ongoing to develop a generic wound care assessment minimum data set and we encourage further development of this.[50]

RECOMMENDATIONS FOR PRACTICE AND RESEARCH

All patients with wounds should be screened for the presence or absence of wound-related odour. If present, assessment could include items that can be captured on NRSs, such as intensity. This can then be followed up by more patient-centered probing questions, such as how much the odour bothers them and how much of an impact it has on them, as seen in some of the most well developed tools, such as TELER and PU-QoL.[32, 33]

CONCLUSION

Wound associated odour is cited by patients and health care professionals as one of the most distressing wound-related symptoms with negative impacts on quality of life. Wound-associated odour may be a sign of underlying infection or wound breakdown. Regardless of the cause of the odour there is a need to recognise its importance in the process of wound assessment. All wounds should be screened for the presence of odour and if present then it should be assessed. We have identified five methods to assess wound odour that are part of an overall wound assessment tool. While they have been well developed they are not well used in published research that incorporates odour assessment. We recommend that clinicians and researchers revisit these tools and try to incorporate them into the wound assessment process and give greater recognition to this distressing wound-related symptom.

AUTHOR CONTRIBUTION

Idea conception: GG
Search strategy development: SP, JDI
Conducting the search: JDI
Screening titles and abstracts: GG, RCJ, EN, JDI, JG
Full text screening: GG, KleB, RCJ, BMcG, EN, JDI, JG
Data extraction: GG, KleB, RCJ, JG
Results generation: GG, RCJ
Manuscript development: GG, CMcI, SP, CH, BMcG, JDI, DP
Manuscript review: GG, CMcI, KleB, SP, CH, BMcG, JDI, JG, DP

CONFLICT OF INTEREST

The authors declare no conflicts of interest.

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