Abstract:

***Background**: Managing chronic wounds is associated with a burden to patients, caregivers, health services and society. The cost of treating these conditions is increasing and there is a lack of clarity regarding the role of dressings in improving outcomes. With chronic wounds becoming more prevalent, and the cost of wound management increasing, strategies using dressings to minimise the healthcare burden are essential.*

***Methods:** A systematic review of the literature was carried out on the role of dressings in DFU, and VLU management strategies, their effectiveness, associated resource use/cost, and quality of life burden for patients. From this evidence base statements were written, regarding chronicity in wounds, burden of illness, healing time, and the role of matrix metalloproteinases (MMPs), early interventions and dressings. A modified Delphi methodology involving two iterations of email questionnaires followed by a face to face meeting was used to validate the statements, in order to arrive at a consensus for each. Clinical experts were selected; representing nurses, surgeons, podiatrists, academics, and policy experts.*

***Results:** In the first round, 38/47 statements reached or exceeded the consensus threshold of 80% and none were rejected. According to the protocol, any statement not confirmed or rejected had to be modified using the comments from participants and resubmitted. In the second round, 5/9 remaining statements were confirmed and none rejected, leaving 4 to discuss at the meeting. All final statements were confirmed with at least 80% consensus.*

***Conclusions:** This modified Delphi panel sought to gain clarity from clinical experts surrounding the use of dressings in the management of chronic wounds. A full consensus statement was developed to help clinicians and policy makers improve the management of patients with these conditions.*

Background

Diabetic Foot Ulcers (DFUs) and Venous Leg Ulcers (VLUs) are two of the most common lower limb wounds.[1] A growing global epidemic of chronic wounds not only leaves patients in pain and with a reduced quality of life, but also causes a significant financial burden to healthcare providers worldwide.[2,3] In 2016, independent research funded by the National Health Service's (NHS) National Institute of Health Research (NIHR) stated that the prevalence of long lasting ulcers below the knee that take longer than six weeks to heal is seen in 15 out of every 10,000 people,[4] which is an increase of threefold on a previous estimate. The impact of these wounds, including DFU and VLU is likely to continue to rise, with an aging population and increasing incidence of diabetes[5] accelerating the growth.

The burden of these wounds is felt not only by patients, but also by carers, families, employers, and by the healthcare system. Should a DFU remain unhealed and eventually require amputation, this is devastating for the patient and their subsequent decreased level of independence, will place a strain on the family or carers. The financial burden to the healthcare system is substantial; an estimate of the cost of chronic wounds to the NHS is between £2.3-3.1 billion (for the year 2005/6).[6] Diabetes UK estimated that in 2014-15 around £1 billion (or approximately £1 in every £140 the NHS spends) is spent on foot ulcers or amputations each year.[7] Prescribing costs are also rising, in 2004 £122 million was spent on wound dressings, and 8 years later in 2012, the prescribing costs for wound dressings had risen by 51% to £184 million.[8] The rise in spending on chronic wounds can be partially attributed to the increasing numbers of people presenting with DFU and VLU. The increased demand has led to a need to create an efficient treatment pathway that will both improve the welfare of substantial numbers of patients and also reduce overall NHS spending. The Scottish Intercollegiate Guidelines Network (SIGN) guideline on the management of Venous Leg Ulcer states that *"Simple non-adherent dressings are recommended in the management of venous leg ulcers".*[9] However, this guidance was issued in 2010, and the more recent National Institute for Health and Care Excellence (NICE) guidelines on the treatment of DFU, updated in January 2016, asks the research question: *What is the clinical effectiveness of different dressing types in treating diabetic foot problems?*[10]

To help improve outcomes, it is important to understand the expected healing process of a wound and being able to identify exactly when a wound deviates from this could reduce costs. Recently, there has been an increase in the understanding of wound physiology and how the micro-environment of a wound is important to achieving wound healing. It has been found that a key family of enzymes, MMPs, have a fundamental role in wound healing. As a result of this understanding, there are new treatment options that work to change the wound environment to promote and stimulate healing.

The uncertainty regarding the use of dressings in wound management and their place in the treatment pathway is clear; many recent Cochrane reviews have not been able to recommend a single type of dressing.[11] To address this, it was proposed to convene a panel of clinical experts to produce a consensus statement using a modified Delphi methodology. This is an anonymous, iterative process, where a group of multidisciplinary experts aimed to reach agreement in areas where there is a lack of explicit and clear guidance for clinical practice.[12] In addition to the role of MMPs, this study aimed to provide understanding on a range of topics including; the definition of chronicity in wounds, the burden of illness, clinical outcomes of reducing healing time and the impact of early interventions on clinical and economic outcomes.

Methods

A systematic literature review (SLR) was the first part of this study. A search strategy consistent with the PICO framework, focusing on Population, Intervention, Comparison and Outcomes, was formulated for the area of wound management. A full list of search terms is available in Table 1.

Table 1: Search terms used

Search terms	Item
(Wound* AND Chronic) OR (Ulcer AND (Pressure OR Diabetic Foot OR Venous Leg)))	Population
Management OR Treatment OR Care	Intervention
Dressing*	Intervention
Resource AND (Use OR Utilisation) OR Cost	Outcome
Quality of Life OR Patient Outcomes OR Burden OR Impact	Outcome
Effectiveness OR Efficacy	Outcome

Online databases were then searched using these search terms for publications looking at clinical, economic and quality of life outcomes in patients with chronic wounds such as DFU, VLU and PU.

Table 2: List of databases used

Search tool	Count
Science Direct	2479
NICE Evidence search	805
Medline (PubMed)	78
CRD (University of York)	47
Cochrane	8
Total exported to EndNote:	3417

Of the 3417 articles retrieved, 827 were included at initial screening. The rest were duplicate of deemed irrelevant at this early stage. After this, a pre-defined set of inclusion and exclusion criteria were applied to the search results. These criteria are shown in Table 3. These criteria were applied by 2 reviewers from the Manchester Met project team.

A broad range of study types was included to allow a large evidence base for the statements that were to be generated.

Eventually, 145 full texts were used in order to inform the development of the statements. A schematic of the literature search is shown in Figure 1.

Table 3: Inclusion and Exclusion Criteria

Inclusion criteria	
Population	Diabetic Foot Ulcer, Venous Leg Ulcer, or a study of mixed wounds that included the aforementioned.
Interventions	Dressings
Outcomes	Wound healing, Wound Area Reduction, healing rate, Quality of Life Outcomes, Economic outcomes
Study design	o Randomised Controlled Trials o Patient Reported Outcomes o Observational studies o Epidemiology Studies o Modelling o Case Studies o Economic studies o Database Studies o Systematic/ Literature Reviews o Treatment pathway/guidelines
Language restrictions	English Language
Search dates	After 1987
Exclusion criteria	
Population	Paediatrics (<18), Acute wounds (including Burns, Trauma, Surgery)
Interventions	Surgical Novel non-surgical (including electrical stimulation, hyperbaric treatment, electrical stimulation) Infection control measures (including silver, iodine or honey) Debridement (including, surgical, maggot) Bioengineered skin substitutes Offloading
Outcomes	Not meeting inclusion criteria
Study design	In vitro studies, review or discussion articles
Language restrictions	Non-English language (if the abstract was available in English and enough data was available, this was included in the data extraction, otherwise these articles were excluded).
Search dates	Before 1987

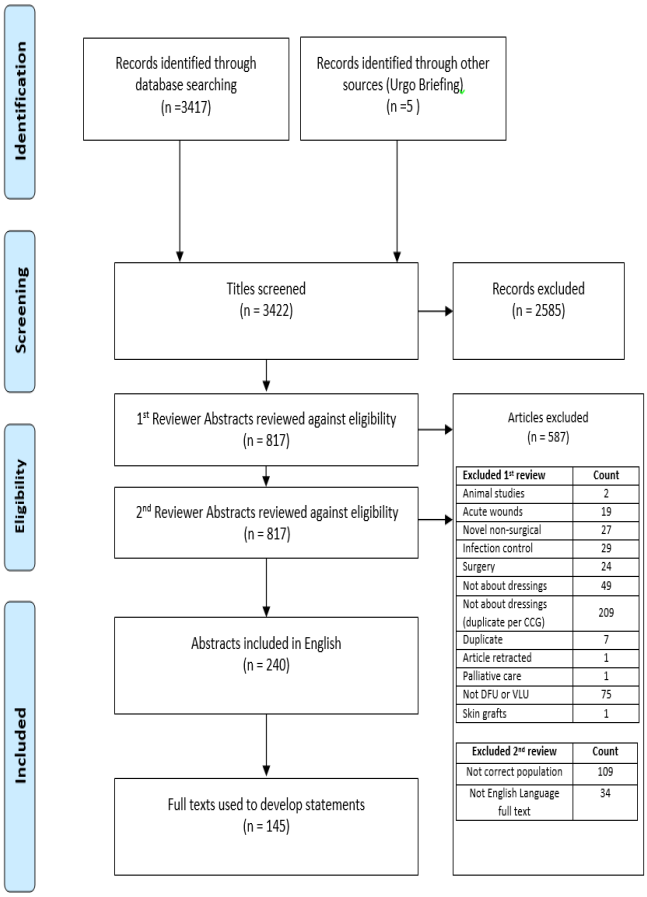

Figure 1: PRISMA Search strategy flow diagram

In order to develop the statements that would be taken forward to the Delphi panel for review, a thematic analysis of the papers was undertaken. 145 texts were reviewed by the project lead, and 304 direct quotations from 131 of the were extracted in four set categories; epidemiology, clinical effectiveness, quality of life, and economics and cost. These quotations were reviewed and agreed as representative by the Manchester Met project team.

A lack of clarity presented itself in many ways, including; an inconclusive systematic literature review, a dressing being deemed as not having enough robust evidence, or as opposing results being published on the same subject.

An assessment of the quotations highlighted many sub categories, which were aggregated under the themes shown in Table 4, and used to develop the 47 statements to put forward to the Delphi panel for voting and further refinement.

Table 4: Themes

Theme	Number of statements
Definition of chronicity	3
Burden of illness	10
Reduce healing time	4
The role of matrix metalloproteinases	13
Early interventions lead to better outcomes	7
The use of dressings and treatments	10

In order to validate the statements, and assess the evidence using a group of experts and their combined wealth of clinical and academic expertise, a modified Delphi methodology was carried out. The Delphi method was developed by the RAND Corporation in the 1950's, and aims to arrive at an expert consensus using an iterative process. The method consists of a group of experts anonymously replying to a questionnaire; then receiving the group feedback, after which this process repeats itself.

The modified process that was used for this study included two rounds of anonymous email voting followed by a face-to-face meeting. The meeting was face to face with all participants and was a very structured round-table meeting with strict agenda. The threshold for consensus was set at 80%, and participants had the option of voting yes or no against the statements, thereby confirming or rejecting the statements respectively. Using previous Delphi methodology studies as a guide, 80% consensus was a relatively high threshold.

The participants were sent an excel sheet workbook that consisted of 6 sheets:

1. Cover sheet: For participants to record their name, affiliation and job title.
2. Introduction: An overview of the workbook and the process.
3. Instructions: An overview of the tasks needed to be completed by the participant.
4. Voting sheet: For the participants to record their responses.
5. References: Full listing of quotations, with bibliographic information and classification of evidence using a modified SIGN system.
6. Search methodology: An overview of the search strategy and results of the SLR.

The voting sheet allowed participants to click on hyperlinks to review the evidence base for each statement; each study was also given a level of evidence classification using a modified version of the SIGN Evidence classification shown in table 5. Participants were invited to review the evidence base for the statements, and were given the full bibliographic information and evidence classification for each source used.

Table 5: Modified SIGN Evidence Classification:

Level	Description
1	Guidelines, Meta-analyses, systematic reviews of RCTs, or RCTs

2	Economic Evaluations, Systematic reviews of case control or cohort studies. Case control or cohort studies
3	Non-analytic studies, e.g. case reports, case series, in vivo or in vitro studies
4	Expert opinion

The panel of 12 members were identified and approached for their experience treating and managing wounds such as DFU, VLU and PU. A range of different specialities were included on the panel; this is to reflect the multidisciplinary care pathway for patients with these chronic wounds. The final clinical experts included in the panel are listed in Table 6.

Any statement that fell in between 80% 'yes' and 80% 'no' was amended by the Manchester Met project team using the comments made by the participants and resubmitted to them in the following round.

This modified methodology was chosen for its iterative and impartial rigour that allowed each participant a fair chance to voice their opinions in the anonymous voting rounds, a step that is important in empowering panel members to voice their opinions amongst the multidisciplinary group.

This study was reviewed and approved by Manchester Metropolitan University Faculty Academic Ethics Committee, with number 1486. Panel members gave informed consent to participate both verbally and in writing.

Results

Twelve panel members were approached, however one panel member dropped out of the process and another was unable to complete the workbook in time for their comments to be included, yet joined the discussion and endorsed the consensus. A final ten participants completed the first workbook and the results of the first anonymous round of voting were as follows: 38 statements confirmed, 9 statements did not reach the 80% consensus threshold and 0 statements were rejected. 18 statements were agreed by 100% of the panel.

The same 10 participants completed the second workbook which consisted of the 9 statements that had been amended and resubmitted, 5 statements were agreed, and 4 did not reach the 80% consensus threshold, 0 were rejected.

At the meeting, the remaining 4 statements were amended and presented to the panel, where they gained consensus. Due to the large number of statements confirmed before the final round; it was considered prudent to revisit comments on statements which had been confirmed with a level of 80-99%, in order to increase the level of agreement and ensure semantic clarity.

After the meeting, the statements were collected, ordered, and presented in the below consensus statement for dissemination. The statements themselves are identified with bold text, and underlined words or phrases are defined in Table 5 at the end of the statement.

Consensus statement

There is a need for consensus when the literature or guidance does not provide clarity. This lack of clarity can be identified by: contradictory information in the literature, a lack of robust evidence or systematic reviews that prove inconclusive. Recent reports and guidelines on wound management are not specific and do not make recommendations on treatment options. The Cochrane Review "Protease-modulating matrix treatments for healing venous leg ulcers" identifies the need for further research into these dressings.[13]

Contents of this consensus statement:

1. The role of matrix metalloproteinases (MMPs)
2. Quality of life for patients with DFU, VLU and PU
3. Time to healing and NHS burden
4. Early intervention and economic impact
5. Conclusions
6. Definitions
7. Panel Members

1. The role of MMPs in chronic wounds:

Wounds are deemed chronic when they do not follow a normal healing pattern and can be perpetuated by having an underlying aetiology.[14-19] A normal healing pattern contains four phases of healing categorised according to the activity of their cellular components: haemostasis phase, inflammatory phase, proliferative phase, and maturation (or remodelling) phase. Wounds with underlying aetiologies include Diabetic Foot Ulcers (DFUs), Venous Leg Ulcers, (VLUs) and Pressure Ulcers (PUs).

Matrix metalloproteinases (MMPs) are a part of healthy healing, expressed at the inflammatory phase of early wound healing.[20 - 24] MMPs are enzymes that are responsible for degradation of the extracellular matrix and also play a pivotal role in regulation of cell proliferation, migration, differentiation, and death. **When a wound moves to the proliferative phase of healing, the level of MMPs fall.**[25] If the wound does not advance to the proliferative phase of healing in an expected time period, it can be considered chronic. **These chronic wounds have been shown to have up to 30 times the level of MMPs than an acute wound.**[26-31]

Wounds such as DFU, VLU and PU are shown to have raised levels of MMPs from first presentation to a wound care

specialist.[32-36] With raised levels of MMPs, the wound is stuck in the inflammation phase, leading to the destruction of new tissues,[37-40] thus preventing progression to the next stage of healing.[41-43]

Persistently elevated levels of MMP are predictive of non-healing[44-48] and specifically, of the 24 known MMPs, MMP-9 has been shown to be detrimental to healing, killing growth factors. [49 - 53] Interventions that modulate the wound environment may enhance healing [54 - 60] because evidence suggests removing excess MMPs from wounds improves healing. [61-65] A specific MMP-9 inhibitor is potentially more effective in stimulating healing[66-68] than standard care alone. In addition to modulating the wound environment, the ideal dressing should be cost-effective, acceptable to the patient and also be effective on older and larger wounds.[69-84]

The lipido-colloid nano-oligosaccharide factor (TLC-NOSF) technology inhibits MMPs and accelerates healing,[85-88] it has been shown as superior to basic foam dressings in reducing healing time [89, 90] and as superior to oxidized regenerated cellulose and collagen, especially in non-responsive, older wounds. [91] Further to this, TLC- NOSF has been shown to reduce levels of MMP-9 in vitro.[92, 93]

2. Quality of life for patients with DFU, VLU and PU

Wounds such as DFU, VLU and PU are associated with increased morbidity and mortality. [94 - 99] In addition to this increased risk of death and high likelihood of comorbidities, patients with these conditions suffer significantly reduced health related quality of life across dimensions such as pain, physical limitation, social isolation, and anxiety/depression.[100-104] The psychological impact of these wounds can be severe, with patients reporting a loss of self, poor self-image, feelings of being a burden and hopelessness for the future.[105-109] These wounds can take a long time to heal and have a high likelihood of recurrence, which again detracts from quality of life.[110-116] Clinician focus tends to be on the treatment of the wound, which fails to account for the large psychological and social burden experienced by some patients.[117-120]

The pain caused by chronic wounds impacts quality of life.[121-124] Dressing changes can be a cause of pain: products and techniques to minimise this are recommended.[125-129] Dressing changes and local management of the wound site is considered easy in most cases with the TLC-NOSF dressing,[130, 131] which has also been shown to significantly reduce pain/discomfort and anxiety/depression for a patient.[132, 133]

In addition to the health related quality of life burden, the patient also faces financial costs such as time away from work, early retirement, medications, dressings, and transport costs.[134-137] Chronic wounds are a burden to both the patient and to the carer [138] and this cost is often excluded or underestimated in cost-effectiveness models.[139-144]

3. Time to healing and NHS burden

As well as a quality of life burden to patients, DFU, VLU and PU are a significant workload burden for healthcare providers.[145-155] Home visits are a key driver of the cost to treat chronic wounds. [156 - 160] Advanced dressings require fewer changes and therefore fewer visits are more likely to reduce costs, especially when the dressing also reduces healing time.[161-165] Protease inhibitors have been shown to be a cost-effective option. [166 - 169] Management plans associated with shorter treatment periods and fewer adverse events are more cost-effective.[170-175] Ulcers can be slow to heal, with wound size and duration affecting healing.[176 - 180] The initial wound area reduction at 4 weeks is predictive of healing by 24 weeks.[181-183]

4. Early intervention and economic impact

Early diagnosis and treatment of a DFU, VLU or PU can improve quality of life for a patient. [184, 185] This early investment in treatment provides a reduction in long-term costs; prolonged futile treatment is more costly.[186-189] There is a need for a long-term view from decision makers, for example, the purchase price of a dressing is not indicative of cost-effectiveness.[190]

Some ulcers are more expensive to manage, these include: chronic wounds, recurrent wounds, and older wounds.[191-195] Older wounds are harder and more expensive to heal so early intervention will reduce the healing time and cost.[196-200] VLU is more prevalent in older populations who may benefit from less invasive treatment options.[201-204] An adjunctive therapy such as a dressing that modulates the microenvironment can promote faster healing in complicated wounds. [205 - 211] An adjunctive therapy to standard wound care should be considered in cases where you anticipate wound healing may be compromised.[212-217]

5. Conclusions

This consensus process seeks to provide clarity for the management of chronic wounds. We have agreed that:

- Chronic wounds including DFU, VLU and PU significantly impair a patient's health and quality of life and this needs to be taken into consideration in patient care with the aim of reducing healing time.
- Inhibiting MMPs plays an important role in wound healing and raised levels of these enzymes have been shown to be present in DFU, VLU and PU.
- Early interventions are a more cost-effective option, both in terms of health and quality of life improvement for a patient and in financial savings to the healthcare system

6. Definitions

Table 5: Consensus statement definitions

Term (in order of appearance)	Definition
Normal healing pattern	A normal healing pattern contains four phases of healing categorised

	according to the activity of their cellular components. The phases are haemostasis phase, inflammatory phase, proliferative phase, and maturation (or remodelling) phase. Normal healing will move through these phases naturally at a predictable rate.
Aetiology	The cause or origin of a disease or disorder as determined by medical diagnosis. (The American Heritage® Medical Dictionary Copyright © 2007, 2004 by Houghton Mifflin Company)
Matrix metalloproteinases (MMPs)	By regulating the integrity and composition of the extracellular matrix, these enzymes play a pivotal role in the control of signals elicited by matrix molecules that regulate cell proliferation, differentiation, and death. (Farlex Partner Medical Dictionary © Farlex 2012)
Acute wound	An acute wound is an injury to the skin that occurs suddenly rather than over time. It heals at a predictable and expected rate according to the normal wound healing process: (http://www.woundcarecenters.org/article/wound-types/acute-wounds)
Basic foam dressings	A foam dressing with no active agents.
Morbidity	A diseased condition or state.
Mortality	Likelihood of death, or death rate.
Significantly	Having reached statistical significance.
Carer	An unpaid carer; a relative, friend or neighbour.
Healthcare Providers	Any individual, institution, or agency that provides health services.
Advanced dressings	Dressings that regulate wound healing by simple physicochemical means, typically by controlling moisture levels. (NICE Evidence summary [ESMPB2] March 2016)
Adjunctive therapy	Another treatment used together with the primary treatment. Its purpose is to assist the primary treatment. (PubMed Health Glossary: Source: NIH - National Cancer Institute)
Standard wound care	Standard care used to promote wound healing, which can be achieved through off-loading in DFU, compression in VLU and/ or repositioning in PU

7. Panel Members:

The panel was made up of a multidisciplinary group and was supported by a group of technical experts to advise on the methodology. The panel members with voting rights are

Name	Title	Place of work
Professor Nancy Devlin	Panel Chair Person	Office of Health Economics
April Betts	Project Manager	Manchester Metropolitan University
Professor Isaac Odeyemi	Visiting Professor of Health Technology Assessment and Health Policy	Manchester Metropolitan University
Professor Francis Fatoye	Professor of Health Economics and Outcomes	Manchester Metropolitan University
Dr Gillian Yeowell	MSc Advanced Physiotherapy programme leader	Manchester Metropolitan University
Richard Shorney	Meeting Facilitator	Real Healthcare Solutions

listed in Table 7, and the technical experts in Table 6.

Table 6: Technical experts

Table 7: Clinical experts

Name	Title	Place of work
Dr Leanne Atkin	Vascular Nurse Specialist	Mid Yorks NHS
Dr Caroline Dowsett	Nurse Consultant Tissue Viability	East London NHS Foundation Trust, London
Sarah Gardner	Clinical Lead, Tissue Viability	Oxford Health NHS Foundation Trust
Dr Julie Green	Senior Lecturer in Nursing, Director of Postgraduate Programmes	Keele University, School of Nursing and Midwifery
Dr Chris Manu	Consultant Diabetologist and Clinical Researcher in Diabetic Foot	Kings College Hospital, London
Tracey McKenzie	Head of Tissue Viability Services	Torbay and Southern Devon NHS Foundation Trust
Helena Meally	Hospital Podiatrist	Leeds Teaching Hospitals NHS Trust
Louise Mitchell	Clinical Lead Podiatrist	Birmingham Community HealthCare
Julie Mullings	Lead Tissue Viability Nurse	University Hospital South Manchester
David Russell	Consultant Vascular Surgeon and Honorary Clinical Associate Professor	Leeds Teaching Hospitals NHS Trust
Andrew Sharpe	Advanced Podiatrist and Lecturer Practitioner	West Lancashire Community Service, Virgin Care Ltd and University of Huddersfield

Discussion

A lack of clear evidence supporting a single treatment strategy, or mandated clinical guidance can have a detrimental impact on emerging technologies. Reviews relying solely on the literature, and not clinical opinion, often present uncertainty, such as the review carried out by Cochrane in 2016, *Protease-modulating matrix treatments for healing venous leg ulcers*. This systematic literature review declared the evidence not conclusive and the certainty judged as low. This however, does not mean that the available evidence is of no use to clinicians, as demonstrated by the consensus panel. New studies, published and ongoing, have been designed to assess the efficacy and tolerability of specific protease modulating matrix treatments.

New evidence available has shown promising results. A manuscript exploring the real world usage of a protease modulating dressing has now been published (Munter 2017). The quality of life endpoints associated with this dressing have been explored in Meaume 2017, and ClinicalTrials.gov shows that a trial titled "Assessment of the Efficacy and Safety of a New Wound Dressing in the Local Treatment of Diabetic Foot Ulcers" is due to report. The Cochrane Collaboration has also just registered a protocol looking into the efficacy of using protease levels to predict healing outcomes in VLU patients.

The objective of this project was to provide clear guidance for clinical practice on a range of topics where there is a lack of clarity in the literature. The rigorous process that was followed has generated a consensus statement, agreed by a multidisciplinary panel.

The certainty of evidence for wound care dressings is low, as evidenced by a series of inconclusive Cochrane reviews (hydrocolloid, alginate, hydrogel, foam, protease-modulating matrix treatments) that found low levels of evidence and high risk of bias. [218],[219], [220], [221], [222]. Cochrane risk of bias tools judge using blinding criteria that are difficult to meet in any wound trial; due to practical issues with packaging, nurse involvement etc. In light of this; this consensus panel allowed the participants to judge the validity of the evidence in the context of their own clinical expertise.

The consensus statement agrees that chronic wounds have a significant impact on a patient, regarding both their health and quality of life. In order to mitigate this for the patient and the healthcare provider, early intervention is key to successful treatment. The role of MMPs in wound healing is important, and in wounds with raised MMP levels, such as DFU, VLU and PU, a MMP inhibitor can expedite wound healing.

The modified Delphi process has many benefits, such as the anonymity enjoyed by the participants in the first two rounds. This helped to ensure a wide range of expert opinions were collected with the return of the workbooks. The face to face meeting after this was to allow the panel to come together as a group and review the study output. It is possible that the face-to-face element may weaken the strength of the methodology, however an individual's earlier comments remained anonymous and the Chairperson present ensured that the review of comments was without derision. The process is also iterative, and the systematic review of the literature carried out prior to the Delphi process ensured it is supported by evidence, repeatable and transparent.

The strength of the process became apparent after the first round, with 80% of the statements reaching the consensus threshold. This could be attributed to a number of factors,

including the body of evidence presented in the workbook, the anonymity provided preventing individuals unduly influencing others, or perhaps the lack of clarity in the literature is not reflected in clinical practice. At the end of the process, all of the original statements had been confirmed, with modifications. This can once again be attributed to the fact that the methodology allowed the participants' comments to inform amendment of the statements when resubmitted. This flexibility in the approach allowed for more participation and elicited more expertise from the panel members. However, a limitation of the methodology relates to the binary yes/no structure of the questions. This process could be further improved by amending the voting to a scale which would allow for more ranking of the statements.

The Delphi process differs from a traditional expert panel or advisory board, the participants of an advisory board are likely to meet once, for a few hours and have a semi-structured discussion, often based on some pre-work The modified Delphi methodology used in this study allowed direct access to the evidence base for the statements, and participants were granted anonymity when sharing their opinions. Due to the high consensus levels, it is possible that the statements generated from the SLR were more based on fact and evidence than they were opinion, however the Delphi method proves to be a good tool for validating the output of a literature review with a multidisciplinary panel. Perhaps in future studies, the Delphi methodology can be used in more subjective areas such as guidelines and treatment pathways.

It is hoped that the dissemination of the consensus statement will lead to an improvement in patient care, and a reduction in costs for the healthcare system when tackling the issue of ulcers of varying aetiologies. The increasing prevalence of these wounds, especially DFU, calls for more research into wound management, the mode of action of MMP inhibitors, and how to maximise efficiencies in the healthcare system whilst maintaining a gold standard of care for patients.

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