

*Exploring the
concept of a
team approach
to wound care*

MANAGING WOUNDS AS A TEAM

A joint position document



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Abstract

Background

The growing prevalence and incidence of non-healing acute and chronic wounds is a worrying concern. A major challenge is the lack of united services aimed at addressing the complex needs of individuals with wounds. However, the WHO argues that interprofessional collaboration in education and practice is key to providing the best patient care, enhancing clinical and health-related outcomes and strengthening the health system.

It is based on this background that the team approach to wound care project was conceptualised. The project was jointly initiated and realised by the Association for the Advancement of Wound Care (AAWC-USA), the Australian Wound Management Association (AWMA) and the European Wound Management Association (EWMA).

Aim

The aim of this project was to develop a universal model for the adoption of a team approach to wound care.

Objective

The overarching objective of this project was to provide recommendations for implementing a team approach to wound care within all clinical settings and through this to develop a model for advocating the team approach toward decision makers in national government levels.

Method

An integrative literature review was conducted. Using this knowledge, the authors arrived at a consensus on the most appropriate model to adopt and realise a team approach to wound care.

Results

Eighty four articles met the inclusion criteria. Following data extraction, it was evident that none of the articles provided a definition for the terms multidisciplinary, interdisciplinary or transdisciplinary in the context of wound care. Given this lack of clarity within the wound care literature, the authors have here developed a Universal Model for the Team Approach to Wound Care to fill this gap in our current understanding.

Conclusion

We advocate that the patient should be at the heart of all decision-making, as working with the Universal Model for the Team Approach to Wound Care begins with the needs of the patient. To facilitate this, we suggest use of a wound navigator who acts as an advocate for the patient. Overall, we feel that the guidance provided within this document serves to illuminate the importance of a team approach to wound care, in addition to providing a clear model on how to achieve such an approach to care. We look forward to gathering evidence of the impact of this model of care on clinical and financial outcomes and will continue to share updates over time.

Introduction

Changing population demographics resulting in an increased prevalence and incidence of multisystem chronic diseases means that health care services are continuously challenged to provide increasingly complex interventions with limited resources, coupled with a decreasing availability of suitably qualified health professionals.¹ Patient safety is at the centre of all health-care interventions, meaning that health care providers have to demonstrate an evidence-based, cost-effective and efficient rationale for the choice of specific care pathways for individual patient groups.² The WHO argues that professionals who actively bring the skills of different individuals together, with the aim of clearly addressing the health-care needs of patients and the community, will strengthen the health system and lead to enhanced clinical and health-related outcomes.³ Indeed, a number of systematic reviews have noted a positive impact in the use of multidisciplinary interventions for chronic diseases such as heart failure and mental illness, and in individuals at risk of poor nutrition.⁴⁻⁶ These positive outcomes relate to reduction in hospital admissions, mortality and incidence of heart failure as well as fewer suicide-related deaths, less dissatisfaction with care, fewer drop-outs and an overall reduction in the length of hospital stay.

It is based on this background that the team approach to wound care project was conceptualised. The project was jointly initiated and realised by the Association for the Advancement of Wound Care (AAWC-USA), the Australian Wound Management Association

(AWMA) and the European Wound Management Association (EWMA).

Project Aim

The aim of this project was to provide a universal model for the adoption of a team approach to wound care.

Project objectives

The project objectives were to:

- Conduct a systematic review of the literature to identify the advantages and disadvantages of adopting a team approach to wound care;
- Identify the definition of a team approach to wound care;
- Identify the barriers and facilitators to adopting a team approach to wound care;
- Provide recommendations for implementing a team approach to wound care within the clinical setting;
- Provide a tool for advocating a team approach to wound care towards decision-makers at national government levels;
- Create a basis for collaboration between organisations and institutions working with clinical conditions that benefit from the team approach to wound care;

-
- Contribute to current initiatives aiming to strengthen integrated care processes such as the European Innovation Partnership on Active and Healthy Aging.

Overview of the Document

This document is divided into four sections; the first section provides an overview of the interdisciplinary team approach. In doing so, this section begins by addressing the problem of wounds, followed by a historical overview of teamwork. A definition of commonly used terms is then provided with a discussion of how these definitions apply to wound care. Section two explores the clinical evidence for managing wounds

as a team. In this section, the methods of the included studies in this document are outlined. This is followed by a discussion of the study populations, care settings, team interventions, primary and secondary outcomes and methodological challenges within the included studies. Section three addresses the barriers and facilitators to achieving a team approach to wound care. The focus of this section is on the will of participating clinicians and the pragmatics of service delivery. The fourth section proposes a universal model for a team approach to wound care and in doing so, elaborates on the key considerations in striving for such a model of care. Finally a summary and conclusion is provided, bringing the salient points of the document together.

The problem of wounds

From a wound care perspective, the growing prevalence and incidence of non-healing acute and chronic wounds is a worrying concern. Indeed, the incidence of wounds in the EU-27 is approximately 4 million and a further 2 million patients acquire nosocomial (hospital-acquired) infections each year.⁷ Additionally, it is estimated that more than 23% of all hospital in-patients have a pressure ulcer and most pressure ulcers occur during hospitalisation for an acute episode of illness/injury.⁸ The cost of just one problematic wound is between €6650–€10000 per patient, and the total cost of wound care accounts for 2–4 % of European health care budgets.⁹ Furthermore, 27–50% of acute hospital beds are likely to be occupied on any day by patients with a wound.⁹

One of the biggest challenges in wound care is the lack of united services aimed at addressing all the health care needs of individuals with wounds.¹⁰ Indeed, more than a decade ago, Lindholm et al.¹¹ warned that lack of integrated wound care services compounds the suffering of those with wounds, which in turn substantially increases associated costs arising due to poorer outcomes than could be expected with use of targeted wound care interventions. Conversely, focussed patient screening, followed by implementation of appropriate care pathways, with close follow up and monitoring by relevant members of the

wound care team can substantially improve clinical outcomes and reduce unnecessary morbidity and mortality.^{12, 13} However, despite this evidence, reports on the use of focussed interdisciplinary wound care teams is scarce within the literature, with disparity existing as to what the term ‘interdisciplinary’ means, and who exactly is eligible to be a member of this interdisciplinary wound care team.¹⁴

Teamwork – A historical overview

An interesting paper by Hasler¹⁵ provides a historical overview of the development and integration of the concept of health care teams within primary care services in the UK. Hasler argues that development of teamwork arose for many reasons beyond the actual desire of individuals to start working together. For example, legislation surrounding the enhancement of the scope of practice of different team members enhanced the potential for other team members to engage more actively in a team approach to care delivery. Furthermore, reimbursement systems provided specific funding for employing other members of the team. Changes were also made in the contractual systems which made enhanced competitiveness a central component of ongoing funding and patient willingness to engage with services offering such a team approach.

In the US, the Institute of Medicine¹⁶ has identified an urgent need for high-functioning teams to address the increasing complexity of information and interpersonal connections required in contemporary healthcare. The transition of practitioners' from soloists to members of an orchestra has gained national momentum through healthcare reform with substantial interprofessional policy and practice development in recent years.¹⁷ Best practice collaborations have identified the basic principles and values for team based care, and support for inter-professional learning strategies is increasing^{16, 17}.

From a wider legislative perspective, a greater focus on patient safety, combined with reduced resources available for health-care services has demanded a re-evaluation of the approaches to care delivery.¹⁸ One of the most important drivers for this change is the increasing emphasis being placed on the adoption of person-centred approaches to care delivery.¹⁹ At its essence, the adoption of a team approach is argued as being fundamental to achieving these goals.¹⁸ However, one of the major challenges in moving from promoted to lived adoption of team work lies in the use of confusing, often interchangeable terminology that is poorly understood, and even more poorly implemented in practice.²⁰ The terms multidisciplinary, interdisciplinary, crossdisciplinary and transdisciplinary are common terms found in the literature used to describe working in a team, yet each term suggest different approaches and thus cannot and should not be used interchangeably.¹⁸

Definition of commonly used terms

Multidisciplinary

"A multidisciplinary team is a group of health care workers who are members of different disciplines (professions e.g. psychiatrists, social workers), each providing specific services to the patient. The

team members independently treat various issues a patient may have, focusing on the issues in which they specialise".²¹

Interdisciplinary

"An interdisciplinary clinical team is a consistent grouping of people from relevant clinical disciplines, ideally inclusive of the patient, whose interactions are guided by specific team functions and processes to achieve team-defined favourable patient outcomes".²²

Transdisciplinary

"Transdisciplinary is the most advanced level, and includes scientists, non-scientists, and other stakeholders who go beyond or transcend the disciplinary boundaries through role release and expansion".¹⁸

The concept of multidisciplinary therefore suggests the use of different disciplines to answer a particular clinical problem, but rather than coming together, each discipline stays within their own boundaries.²⁰ Conversely, the concept of interdisciplinarity suggests that there is a link between the disciplines where each moves from their own position into one collective group. This group is then engaged in creating and applying new knowledge which exists outside of the disciplines involved.²⁰ The fundamental difference between the concept of transdisciplinary care and interdisciplinary care is the actual bringing of new knowledge into the group through a transdisciplinary approach, and as such, this is seen as the union of all interdisciplinary efforts.²⁰

Fundamentally, the central issue is that the group of relevant disciplines is such that the needs of the patient group can be addressed appropriately. Additionally, the group needs to truly work as a team to ensure that all the available skills and expertise can be targeted in an appropriate fashion. Importantly, the focus should be on

the patients' needs and expectations. It is here therefore, that the significance of the word "team" becomes evident.

A team is defined as

"A number of people with complementary skills who are committed to a common purpose, performance goals, and approach for which they are mutually accountable".²³

Whereas, a team-based health care is defined as:

"Team based health-care is the provision of health services to individuals, families and or their communities by at least two health providers who work collaboratively with patients and their caregivers – to the extent preferred by each patient – to accomplish shared goals within and across settings to achieve coordinated, high quality care"¹⁶

Therefore, the reason why the term "team" is important is because it is within this concept that the members are focussed on working in such a way to achieve a mutually agreed goal. Furthermore, the work of the team is interdependent and team members share responsibility and are accountable for attaining the desired results.¹

The definitions as they apply to wound care

A systematic search of the literature was conducted as follows:

- Database(s): Medline, PUBMED, CINAHL
- Language: English
- Search words: (((((((("Leg Ulcer"[Mesh]) OR "Pressure Ulcer"[Mesh])) OR ("pressure ulcer*" OR "pressure sore*" OR "bed sore*" OR "bed

ulcer*" OR "decubitus" OR "pressure area*")))) OR ("leg ulcer*" OR "diabetic foot")) AND (((((((("multidisciplinary"[All Fields]) OR "interdisciplinary"[All Fields]) OR collaborat* OR interprofessional) OR "patient care team*" OR "care pathway*" OR "care bundle*")) OR "Patient Care Team"[Mesh])

Eighty four articles met the inclusion criteria (original research) and were data extracted using the following headings:

- Author
- Title
- Journal
- Year
- Country
- Wound Type
- Definition of the Multidisciplinary Treatment Team (MDT)
- MDT Composition
- Other

Following data extraction, it was evident that none of the articles provided a definition for what was meant by multidisciplinary, interdisciplinary or transdisciplinary in the context of wound care. The focus of the articles tended to be on who exactly comprised the members of the team, rather than the model upon which the composition of the team was based. Thus, there is a significant lack of clarity within the wound care literature, meaning that individual interpretation of the concepts is highly likely and as such largely unhelpful in guiding practice in the area.

Owing to this lack of clarity, the authors of this document propose the following terminology: “Managing Wounds as a Team”. The rationale for the choice of this terminology lies in the thought that there is evidence within the literature of an understanding of the meaning of the concept of “team”. Furthermore, all members of the team are

equally important, and this includes the patient, as in the absence of this understanding, the team will not function effectively. In addition, from a health and social gain perspective, patients report higher levels of satisfaction, better acceptance of care and improved health outcomes following treatment by a collaborative team.²⁴

Clinical evidence for managing wounds as a team

Introduction

Since the original 1990 Saint Vincent Declaration mission to reduce the amputation rate in patients with diabetes by 50%, diabetes care delivery by organised teams have been promoted as best practice, with many international guidelines on the care of diabetes and diabetic foot care following suit. From a pressure ulcer perspective, recent quality initiatives suggest that the prevention and treatment of pressure ulcers should also be undertaken using a team approach.¹¹ In addition, team interventions for leg ulcer care have been advocated by clinical practice guidelines.¹¹ An analysis of the recent literature on team intervention depicted the current state of wound care practice and suggests a vision for future wound team development. The following section elaborates on the outcomes of the literature search, providing a synthesis of the published literature obtained.

Literature search outcomes

We conducted a literature search as described in the introduction. The search produced 84 articles, with additional sources identified in index searches. Two reviewers screened the identified titles, abstracts and then full text of all potentially relevant reports

to reach consensus on 76 included publications. Publication years spanned 1995–2013, with a notable increase in the frequency of articles relating to managing wounds as a team (MWT) in the past six years. Journals which published MWT articles included nearly every wound-related specialty and represented multiple professional sectors. Primary authorship ranged across specialties with the highest first author group noted as physicians for diabetic foot ulcers and nurses for pressure ulcers. The studies originated from 23 different countries representing nearly every continent. The literature included diabetic foot ulcer care (n=31), pressure ulcer care (n=24), chronic wound care (n=11) and leg ulcer care (n=10). In the following part of this chapter, the literature search outcomes will be described in more detail.

A Team Approach in Wound Care – Methods of Included Studies

Studies pertaining to diabetic foot ulcers (DFU) represented most of studies (n=31). Of these, the majority explored outcomes in relation to the implementation of a team approach to DFU care guided by professional standards or guidelines.^{25–44} Study methodology varied considerably and included case control studies, prospective and

Table 1. Clinical Practice Guidelines on wound care published by Professional Organisations

Professional Organisation / Guidelines on Wound Care	Recommend Team Approach?
Inpatient Management of Diabetic Foot Problems. UK/NICE Clinical Guideline 119 (2013) www.nice.org.uk/guidance/CG119	Yes
Foot Care Service for People with Diabetes Commissioning guide. Implementing NICE guidance (2006)UK/NICE Clinical Guideline CG10 www.nice.org.uk/guidance/CG10	Yes
Standards of Medical Care in Diabetes. American Diabetes Association. Diabetes Care 2001; 34: Suppl 1.	Yes
Practical Guidelines on the Management and Prevention of the Diabetic Foot. Bakker K., Apelqvist J., Schaper, N. C.; on behalf of the International Working Group on the Diabetic Foot Editorial Board , (2011) Diabetes Metab Res Rev 2012; 28(Suppl 1): 225–231.	Yes
National Evidence-Based Guideline on Prevention, Identification and Management of Foot Complications in Diabetes. (Part of the Guidelines on Management of Type 2 Diabetes) 2011. Melbourne Australia. https://www.nhmrc.gov.au/guidelines/publications/di21	Yes
Registered Nurses' Association of Ontario (RNAO). Risk assessment & prevention of pressure ulcers 2011 supplement. Toronto (ON): Registered Nurses' Association of Ontario (RNAO); 2011 http://rnao.ca/bpg/guidelines/risk-assessment-and-prevention-pressure-ulcers	Yes
Association for the Advancement of Wound Care (AAWC). Guideline of pressure ulcer guidelines. Malvern (PA): Association for the Advancement of Wound Care (AAWC); 2010. http://aawconline.org/professional-resources/resources/	Yes
Association for the Advancement of Wound Care (AAWC) Venous Ulcer Guideline. Malvern (PA): Association for the Advancement of Wound Care (AAWC); 2010 Dec. http://aawconline.org/professional-resources/resources/	Yes
Institute for Clinical Systems Improvement (ICSI). Pressure ulcer prevention and treatment protocol. Health care protocol. Bloomington (MN): Institute for Clinical Systems Improvement (ICSI); 2012 https://www.icsi.org/_asset/6t7kxy/PressureUlcer.pdf	Yes
Institute for Clinical Systems Improvement (ICSI). Pressure ulcer prevention and treatment protocol. Health care protocol. Bloomington (MN): Institute for Clinical Systems Improvement (ICSI); 2012 https://www.icsi.org/_asset/6t7kxy/PressureUlcer.pdf	Yes
American College of Foot and Ankle Surgeons Diabetic Foot Disorders: A Clinical Practice Guideline. (2006) Journal of Foot and Ankle Surgery, Vol 45 (5): A1-A40.	Yes
2012 Infectious Diseases Society of America Clinical Practice Guideline for the Diagnosis and Treatment of Diabetic Foot Infections; Clin Infect Dis. (2012) 54 (12): e132-e173	Yes
Management of Diabetes - A national clinical guideline 116 – Management of Diabetic Foot Disease. Scottish Intercollegiate Guidelines Network; 2010 http://www.sign.ac.uk/pdf/sign116.pdf	Yes

retrospective cohort studies, case series, retrospective longitudinal observation, and descriptive approaches. Since the team approach has long been established as the standard, withholding team intervention would not be feasible, and therefore no randomised controlled studies were found. Several cohort studies measured outcomes before and after implementing or reorganising some form of

team approach to care. Study periods ranged from 1–11 years.

Pressure ulcers (n=24) were the next most common wound type in the literature search. The majority of studies were descriptive and observational with the exception of one randomised intervention trial. Chronic wounds studies (n=11) as an entity

have been clustered together by some study authors. The methodology in these studies varied from descriptive program reports, review articles, a retrospective review, a systematic review and a pseudo-randomised cluster trial. Articles pertaining to the management of those with leg ulcers were also included (n=10). The study methodology varied from a randomised controlled trial, a controlled clinical trial, a randomized controlled pilot study, prospective risk analysis study, retrospective reviews, case series and descriptive reports.

A Team Approach in Wound Care – Study Populations

Together, the studies related to DFU^{27, 33, 34, 36, 44, 45} described over 3000 subjects and all reported positive clinical outcomes after wound care team interventions. Similarity was noted in gender distribution (mean 62% male), age (mean=66), duration of diabetes (mean years = 15), HbA1C levels (mean 8.3) and percentage with a neuropathic involvement (88%). Otherwise, there was considerable heterogeneity in comorbidities, ulcer location, ulcer depth and infection of subjects. Comparable variability has been seen in other multi-center reports⁴⁶, which underscores the inherent heterogeneity of the disease.

Because most reports of pressure ulcer team interventions were related to institutional program changes rather than individual patient effects, descriptions of the patient characteristics are vague. Pooled patient characteristics from the skilled nursing or rehabilitation settings revealed a mean age of 79, majority female, greater than 85% with mobility restrictions, greater than 70% incontinent of urine and greater than 50% with feeding dependence.⁴⁷⁻⁵⁰ This reflects a representative population similar to the institutionalised elderly.⁵¹ Study participant characteristics in acute care were sparse.

The pooled study population for chronic wounds includes over 6000 patients, with widely variable

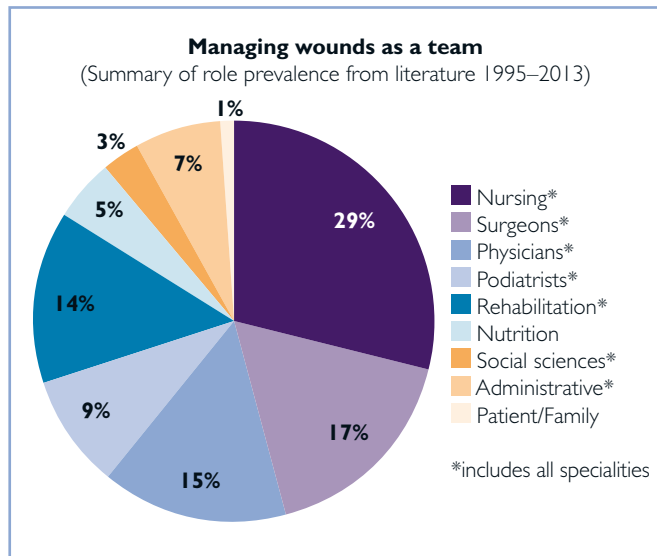
characteristics. The mean age in the skilled nursing setting study was 83 years,⁵² while the mean age for ambulatory settings was 50 years.^{53, 54} All reports treated multiple wound types, with pressure ulcers being the primary type in the skilled nursing study⁵² whereas diabetic –related ulcers were the dominant wound type treated in community⁵⁵ and integrated programs.⁵⁶ Venous ulcers were most prevalent in other ambulatory samples.^{53, 54} Gender distribution was equitable in ambulatory settings^{53, 57} and the majority of patients were female in the skilled nursing setting.¹⁴ With many missing demographic variables in these reports, it is difficult to summarise, but from available data, the heterogeneity of chronic wound populations is evident.

Pooling of the studies on leg ulcer patients together led to the inclusion of over 1500 patients. Although there were missing demographic data, the estimated mean age was 65, with approximately 50% of the participants being female.⁵⁸ Mean ulcer duration, pooled from 4 studies prior to intervention was approximately 40 weeks, indicating a sample with longer duration ulcers.⁵⁹⁻⁶²

A Team Approach in Wound Care – Care Settings

The team approach to diabetic foot ulcer care has been studied in many clinical settings across the care continuum. Much of the evidence comes from integrated programs that manage patients from primary prevention through to acute hospital episodes and subsequent recovery.³⁰⁻³⁴ Of these, most centres were based in university or medical centre hospitals where grouping of professionals from multiple specialties is more easily accomplished. Other authors described the team approach as a consultation service in an acute hospital setting^{25, 29} and in ambulatory diabetic foot ulcer clinics, and others described the standardisation of a team approach to foot care across a network of ambulatory care clinics, which included urban, suburban and rural settings.^{27, 36, 63, 64}

Figure 1. Frequency of specific team members cited in the literature



The benefit of a team approach to diabetic foot ulcer care has also been demonstrated irrespective of the setting. In a claim-based analysis of Medicare recipients in the U.S., Sloan et al.⁶⁵ studied 189,598 individuals with diabetes-related lower extremity conditions for over 6 years. The authors found that patients who visited a podiatrist, in combination with one other lower extremity specialist, were less likely to undergo an amputation than those who did not have multiple care providers. Underlying these results is the assumption that receiving care from multiple specialists results in more coordinated care.

Financial outcome is also promoted as a benefit to team intervention in the care of chronic wounds. Cost reduction has been achieved through saving clinician time,⁵² consolidation of services^{56, 57, 66} and downstream revenue production.⁶⁷

The majority of pressure ulcer studies took place in acute care hospitals (n=15) or skilled nursing

rehabilitation centers (n=7), other settings were paediatric (n=1) and a spinal cord outpatient clinic (n=1). For venous leg ulcers all of the included studies were conducted in an outpatient setting, either in a wound centre or in the home care setting.

Several investigators explored the site of care delivery as a variable in leg ulcer healing. For example, Edwards et al.,⁶¹ in a randomised controlled pilot study, found significantly increased healing rates in an intervention group treated within a team approach to ulcer care, including group community support, when compared with ulcer care delivered by a team in the home setting. Harrison et al.⁶⁰ established a team of specialised nurses with equipment and referral linkages and examined leg ulcer healing rates in the home setting, before and after the new team deployment, and found statistically significant differences in leg ulcer healing rates in the post intervention cohort. In a subsequent trial Harrison et al.⁶⁸ found that specialised nurse team outcomes were similar in patients randomised to the home care setting or clinic based care. The investigators therefore, concluded that it was the organisation of care, delivered by evidence based trained teams that influenced healing rates, rather than the setting of care itself.

Chronic wound care teams have been assembled in settings across the continuum of care delivery. In this review, five programs were described in the outpatient setting.^{53-55, 66, 67} Other settings were the acute care hospital,^{56, 69} a continuum between hospital, rehabilitation and home, and a nursing home setting.⁵⁷

A Team Approach in Wound Care – Team Interventions

A summary of the frequency of specific team members cited in the evidence within this document is seen in Table 2. From the diabetic foot

ulcer perspective, team membership varied from 2 to 10 members and often included additional collaborators such as “primary care team”, “home care nursing service” “research team” and “administrators”. The types of team intervention varied across the spectrum, i.e. the joint surgical approach, service model approach, integrated disease management and various lean approaches.

Armstrong et al.²⁸ conceptualised the team as a podiatric and vascular surgery, “toe and flow” Dyad, with this collaborative model being supported by some researchers.⁴³ Conversely, others employed a wider team support network, such as case management, diabetes education, endocrinology, hospitalists, infectious disease, nursing, prosthetics and social work.³⁰ Importantly, it was stressed that this collaboration should follow the DFU patient through their complete episode of ulceration and across all care settings, in order to ensure maximum outcomes.^{32, 35}

Another approach is termed a “service model”³¹ where intervention components arise from broad standards and a clear patient focus. Combined with performance measures, clinical research and education, the model claims an association between interventions and decreased lower extremity amputations. This approach is supported by others who employed flow sheets, standing orders and algorithms to guide care.⁶³

A further approach using a minimal, intermediate and maximal model of diabetic foot care have been described by the International Working Group for the Diabetic Foot.^{70, 71} This model centres around the specific needs of the diabetic patient, beginning with the provision of preventative care and minor wound care in the minimal domain, moving to more advanced assessment, diagnosis, prevention and treatment in the intermediate domain, with the maximal domain concentrating on advanced prevention and management strategies for complex

cases, including the use of innovative technologies and the provision of education and training for other centres.

Within the pressure ulcer literature, the majority of studies described team facilitation of a new pressure ulcer prevention program.^{47, 72-80} All the programs were multifaceted, often “bundle focused”, and used quality improvement methodology without a control group. Team functions included risk assessment, conducting surveys, product evaluation, education, documentation, providing wound care treatments and planning continuity of care. Multiple interventions were undertaken, but little attempt was made to ascertain what elements, or group of elements, contributed most to the outcome. Therefore, other concurrent factors may have influenced pressure ulcer reduction, for example, changes in clinical practice, electronic medical records, and new technology or specialtybeds.

For chronic wounds, in general, the team approach focussed on centralisation and standardisation of expertise and services.⁹⁸ Team interventions were described as clinical (assessment, diagnosis, provision of care), preventive, scientific and educational.^{14, 53-56, 66, 67, 69} Preventive services involved primary care telemedicine screening⁵⁶, compliance monitoring⁵⁵ and quality improvement monitoring.⁶⁹ Consistent clinical data collection provided outcome management and scientific research opportunities to assess evaluation of interventions and team impact^{53-56, 67}. Knowledge, skills and clinical expertise of the team was fostered through education, provided both internally and externally to the organisation.^{56, 69, 81}

The size and arrangement of teams related to leg ulcer care tend to be leaner than other teams. In the studies reviewed it was common for care to be planned and delivered by specialty nurse teams with expanded skills and referral linkages both within

the community and home care settings.^{61, 82, 83} Other studies^{59, 60, 68, 82, 84} demonstrated that partnerships among different specialities such as nursing, podiatry, dermatology or gerontology, yielded favourable healing rates, when compared with care delivered by a single team speciality.

A Team Approach in Wound Care – Primary Outcomes Measures

For studies related to the diabetic foot, the primary outcome measure was the rate of lower extremity amputation. The included studies all identified a reduction in amputation rates; for example, in one study,³⁷ total amputation rate per 10,000 people with diabetes fell by 70% (from 53.2% to 16.0%) and major amputations fell by 82% (from 36.4% to 6.7%). A further study²⁶ found a progressive decrease in the total incidence of amputations per 100,000 general populations from 10.7 in 1999 to 6.24 in 2003. In yet another study,²⁷ the high/low amputation ratio decreased from 0.35 to 0.27 due to an increase in low level (midfoot) amputations (8.2% vs 26.1%, $p < 0.0001$; OR=4.0, 95% CI 2.0–83.3). A 45.7% reduction in below-knee amputations was also observed. Weck et al.⁸⁵ studied the outcome of a structured system of diabetic foot care encompassing outpatient, inpatient and rehabilitative treatments. Participants were followed prospectively over 8 years and compared to control subjects treated without interdisciplinary care in another region of Germany. The structured integrated team care resulted in a 75% reduction of major amputations compared to standard care. Finally Yesil et al.⁴⁴ reduced major amputations from 20.4% to 12.6% ($p = 0.026$) with the use of a team approach.

A number of published studies describe the organisation of pressure ulcer teams with the primary outcome assessed by pressure ulcer rates measured before and after team initiation. These rates tended to be measured by point prevalence surveys, undertaken either annually or quarterly.^{47,}

^{72-76, 86-88} A reduction in pressure ulcer prevalence after team intervention was reported in all of the studies, with a wide range of variation in starting prevalence (4.85-41%) and in post prevalence (0-22%) and no reported statistical significance levels.

A group of reports from chronic wounds report healing rates as a primary outcome. For example, Brown-Maher⁵³ described an overall 34% wound healing rate for 398 patients over 2 years. Similarly, Sholar et al.⁵⁴ reported an overall 38% wound healing rate over 7 years. Other reports claim healing rates by aetiology such as 60% over 12 months for recalcitrant leg ulcers⁵⁶ and an 8-week average healing time for venous ulcers.⁵⁵

Leg ulcer outcomes were primarily measured by healing rates.^{59, 60, 68, 82, 84, 89} For example, Akesson⁵⁹ found a pre healing rate of 23%, compared with an 82% healing after a team approach. A further study⁸⁴ found that 72% of patients healed with an average time of 12.1 weeks following a team approach.

A Team Approach in Wound Care – Secondary Outcomes

Additional outcome measures have been studied to determine the benefits of team intervention on DFU care within specific foot clinics.³³⁻³⁶ DFU healing rates of 50%⁹⁰, 55%, 65.7%³⁶ 70%⁹⁰, 76.19%³⁵ and 90%³⁴ were reported after follow up periods of 10 weeks⁹⁰ and 6, 12³⁶ and 29³⁵ months across a number of studies. Reference healing rates in DFU have been shown to be 48%–58% healed at 20 weeks⁹¹, as evidenced from a trial of 74 wound centres. By comparison, the largest two studies that followed healing rates until healing or death,^{33, 34} reported healing rates of 74% and 90%, over a mean of 27 and 18 weeks, respectively.

For the diabetic foot, two studies explored the outcome of self-care behaviour performance after an outpatient team approach to patient education. Anselmo et al.⁹² found that 90% of patients

performed all suggested ulcer prevention care, but less than 10% wore the provided footwear. A further study⁹³ found that foot care behaviour improved after 2 years ($p < 0.01$) following patient education, supplies provision and skills practice on a daily foot care regimen, compared to conventional diabetic foot care and just 2 hours of education. Patient satisfaction was another dimension explored as a secondary outcome.^{63, 94} Hjelm et al.⁹⁴ found that patients preferred the team structure and the accessibility and cooperation of the foot team. Furthermore, another study found that health related quality of life (HRQOL) was enhanced in terms of physical and emotional functioning⁶³ following a team intervention.

Patient satisfaction was also a secondary outcome measures explored among those with venous ulceration with patient perception of services being the outcome measure in one survey analysis of a wound centre in Denmark.⁶² Indeed, in this single study, 91% of patients were satisfied with quality of technical care and empathy being the most valued by patients.

A Team Approach in Wound Care – Methodological Issues within Studies

Attribution of the consistently strong positive clinical outcomes solely to team interventions remains difficult. As with most medical phenomena, outcomes are likely to be associated with a vast array of contributing factors, including patient characteristics, site of care, composition of the team and the precise measurement variables. Furthermore, in diabetes care, comparison of amputation rates may be challenging as result of variation in service provision, regional health practice, access to care and specialization density.⁹⁵ Global variation, ethnicity and population heterogeneity have been shown to influence variation in amputation incidence.^{96, 97} The duration of the study also influences the reduction of amputation incidence over time, with longer

duration studies confounded by coincident initiatives,⁹⁷ such as improvements in diagnostic services and pharmaceuticals.

Evidence for the effect of the PU team is based mostly upon descriptive studies with PU prevalence outcome data. Even though the reports are rich with detail about methods of team interventions and interactions, the attribution of clinical outcome solely to PU team involvement is not possible. Further, most of the studies focused on pressure ulcer prevention programs and not as much on treatment approaches by the team.

Despite the acknowledged limitations, the evidence reviewed here provides a consistently positive measure of enhanced outcomes for patients with wounds of varying aetiologies when they are managed using a team approach. Thus, it seems to be evident that a team approach is the best option for managing individuals with the complex problem of wounds. Furthermore, with the availability of well-defined clinical practice guidelines and the existence of a large body of clinical studies, the team approach to wound care should be amenable to standardisation.

Summary

A review and analysis of 18 years of literature related to managing wounds as a team revealed mounting evidence to support a team approach. When analysed according to wound types, literature related to diabetic foot ulcers comprises the largest body of knowledge, with many retrospective and prospective reviews of long term programs, all demonstrating a positive team effect. Outcomes related to leg ulcer team care is supported by the highest quality of evidence. Pressure ulcer team benefits are mostly supported by descriptive reports of program outcomes. The team effect on chronic wound care is supported by a systematic review with emerging additional literature describing positive

effects from care delivered by teams in dedicated wound centres.

Outcome measures for all wound types are generally related to wound healing and amputation rates with some additional qualitative, quantitative and patient-centred endpoints. All outcomes have been reported positively, with no reports of negative consequences of a team intervention. Furthermore, the use of a team approach has been demonstrated in all healthcare settings across the continuum. Overall, study populations have been representative of the wound population at large. In addition, the methodological issues noted in this literature

review are reflective of the research limitations and challenges in wound research as an aggregate.

Additional research is needed to clearly demonstrate the effect of the team approach to wound healing, particularly relating to financial and clinical outcomes, owing to the current challenges regarding reduced health budgets. Patient sensitive outcome measures should also be investigated with specific focus on patient safety. Finally, exploration of the inter-professional educational opportunities in wound care will help differentiate the skill set required to maximize team function.

Barriers & facilitators

The use of the multidisciplinary team in the provision of cancer services has been mandated in the UK, Australia, USA, Canada and Hong Kong.^{98,99} As a result, there is a growing body of literature describing the development of such teams and the outcomes realised. It would appear that the development of a multidisciplinary approach to care is strongly influenced by the 'will' of the participating clinician, the pragmatics of providing the service and the identified changes to the cost-benefit ratio reference. It is also evident that failing to address all three aspects simultaneously will result in, at best, clinician dissatisfaction and, at worst, long-term client complications reference. As we move towards the delivery of multidisciplinary services for clients suffering from a wound, it is prudent to examine each of the above aspects and explore strategies to ensure that positive outcomes are realised.

The 'will' of participating clinicians

The will of clinicians to participate in multidisciplinary care is influenced by their educational preparation and professional socialisation.³ The former will determine their skills when they have to act as a member of a multidisciplinary team, while the latter will determine their perception of other team members

and their role within the multidisciplinary team reference.

Undergraduate programs tend to dedicate considerable resources to developing the technical skills of the graduate.¹⁰⁰ For some professions (e.g. medicine, pharmacy) the ability to examine, investigate, diagnose and treat the condition often forms the focus of undergraduate endeavours. Less time is spent on the non-technical components including communication techniques, teamwork practices and client-focussed care models. As these non-technical skills form the key foundations for multidisciplinary practice it can be postulated that some contemporary health care practitioners receive inadequate preparation for this form of care. Equally, professions who give a greater focus to the non-technical skills (e.g. nursing) may in turn prevent their graduates from being an active member of the decision-making processes within a multidisciplinary team.^{101, 102}

It is evident that if future graduates are to provide multidisciplinary care they will need opportunities within their undergraduate study programmes to develop the necessary skills. While many education providers strive to achieve such experiences for their students, the pragmatics and funding constraints often limit the potentials. When Gardner et al.¹⁰³ surveyed the attitudes of administrators responsible for

profession preparation within the United States, they identified a number of barriers to providing opportunities for students to participate in multidisciplinary teams. Pragmatics such as aligning scheduled classes, the willingness of students to work with other disciplines at a perceived cost to their own studies, and the different levels of student preparation were frequently cited. Interestingly, the costs of providing such opportunities were often seen as an challenge that was difficult to meet within contemporary budgets.

As multidisciplinary wound care teams are formed, time and resources to train health professions to work within a team will be needed. Roleplays, simulations and moderated case discussion are strategies that enable the participant to focus on the non-technical skills whilst communicating the technical data of the client being discussed.¹⁰⁴⁻¹⁰⁶ The goal of interprofessional learning is to prepare and encourage team members to work towards the

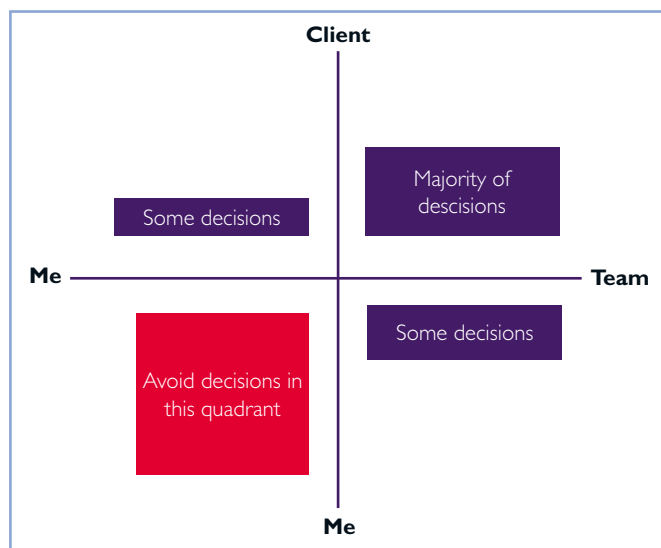
common goal of achieving safer and more patient-centred outcomes.¹⁷ Although the content should be present in all health professional undergraduate programs, opportunities for experienced wound care clinicians to participate in such programs also need to be provided. As Barr stated,¹⁰² the clinicians need to be 'competent to collaborate'. Many competencies are common or overlap with more than one health profession and therefore, enhancement of these collaborative competencies can extend the reach and effectiveness of the entire team.¹⁰⁷

Whilst educational preparation of clinicians participating in a multidisciplinary team is important, of equal importance is the attitude and respect team members bring to the encounter. It is generally agreed that a key fundamental to achieving multidisciplinary care is to ensure participant safety.¹⁰⁸ This is achieved when inter-professional respect and subsequent trust is developed between members.

Established hierarchical structures that perceive the dominance of one profession over another (e.g. medicine over allied health or nursing) often prevents participants from expressing an alternative view for fear of being ridiculed.^{102, 108} In contrary, members of a profession participating in multidisciplinary activities may be 'punished' by their professional peers for venturing beyond their discipline and potentially undermining established power bases.¹⁰⁹

Health service organisations based on the political framework described above create contests between participants, resulting in 'winners and losers'.¹¹⁰ The different funding models used for health care services provide an example of this disparity. Population-based funding models incorporating salaried health care workers is believed to have the highest potential for supporting multidisciplinary teamwork.¹⁰⁸ A focus

Figure 2. Narcissistic-Me Model (Modified from Dorahy & Hamilton 2009)¹¹⁶



of generating income to support the organisation is reduced with a population-based funding model and clinicians are more inclined to dedicate time to client interactions and team meetings required for multidisciplinary practice. A 'fee for service' model changes the focus to one of income generation. This model often reduces time spent with clients in order to maximise throughput and perceives time dedicated to team meetings as a cost to the organisation. A fee for service model may also result in 'gaming' the system. Activities that could reliably be performed by one health professional such as the nurse are undertaken by another health professional (doctor) as the fee for the latter is higher.¹⁰⁸ This clearly works against multidisciplinary practice where team members are able to contribute to the care of the client based on their expertise.

Multidisciplinary teams formed within a political frame are more likely to be impacted by other gaming strategies. The transfer of hierarchical structures and attitudes to the team often results in meetings structured as information dissemination from the leader to the followers than a genuine sharing and discussing of ideas.^{109, 111–113} As a result, participants report that they learn to 'play the game' in an effort to have their opinion incorporated. The team member makes subtle suggestions implying that it was derived from the comments of the leader and the leader then incorporates the suggestion and presents it as their own idea.^{111–115}

Having emphasised the importance of mutual respect within multidisciplinary teams, it is equally important that the team members are able to maintain separate identities. Members are invited to the group to share their professional opinion. As a result, consensus may be reached about treatment strategies or conversely, members may agree to disagree. Being comfortable with differing opinions from the team helps to ensure that the group remains open to alternative approaches to

care. If groups become too harmonious, there is a risk of "groupthink" developing. This occurs when members have a strong feeling of solidarity and are prepared to defend the group from internal and external 'attack'.^{116, 117} Maintaining the group at all cost reduces the responsiveness of the group to external opinion and internal difference of opinion. Furthermore, "groupthink" may prevent innovative approaches to client problems and hamper effective referral mechanisms.

Dorahy and Hamilton¹¹⁶ suggested a method for maintaining a professional identity whilst adopting a team identity. The model called 'The Narcissistic-We' suggests that multidisciplinary teams operate on two continuums. The first is a "me-to-team" continuum and the second is a "me-to-client" continuum. The two continuums are placed at right angles to form four quadrants of decision-making (Figure 2). The authors suggests that most decision should come from the "Client-Team" quadrant, but on occasions, some decisions will be required from the "Me-Client" and the "Me-Team" quadrants. In short, most decisions should be made by team and client collaborations, but at times, health professionals will be required to make decisions between themselves and the client alone, or between themselves and the team alone. This suggests that effective multidisciplinary teams incorporate dynamics that work towards a team approach to client problems but maintain the right of individual members of the team (professional or clients) to operate independent of "groupthink" when required.

Maintenance of professional identity is distinctly different than clinging to a single vision about a clinical view. The "silo" approach suggests a narrow and self-sufficient treatment system, able to stand alone without interference from other disciplines. Contemporary healthcare complexities, patient centred care and rapid advances in knowledge preclude this approach from survival.

According to the 2012 Institute of Medicine report, several core personal values are necessary for individuals to function as effective members of high-functioning teams. Described through “reality check” interviews with team members in a US collaborative, these values included honesty, discipline, creativity, humility and curiosity.¹⁶ Maintenance of individual integrity and ethics harmonises with collaborative competency for effective team functioning.

Clearly, as multidisciplinary wound teams are formed, attention should be paid to educate members on how to function as a team. Equally, a regular review of the team dynamic will be needed to ensure that traditional professional boundaries do not inhibit participation and that opportunities to maintain a professional identity, while adopting a team identity, are incorporated. If this can be achieved, the research suggests that client satisfactions will be higher, as is job satisfaction for the health professionals.¹¹⁸

Forming the multidisciplinary team is only one aspect of providing a multidisciplinary wound care service. Developing systems and resources that ensure the team function effectively is also essential.

The pragmatics of service delivery

A multidisciplinary wound care service requires access to a range of health professionals and communication structures to facilitate inter-professional consultation. While the concept is easy to understand, the pragmatics of delivering such a service are complex. Establishing the services required for a given client will require health care personnel that are familiar with the services provided by various team members and have an ability to construct individual care plans. Health professionals, by definition, are autonomous. While the need to collaborate with other professionals is recognised, the work

of each professional is structured around an independent practice. A multidisciplinary wound care service will require team-based systems that may at times conflict with the above systems. The geographic location of team members, the manner in which they communicate, the time given to communication and the system of remuneration requires innovative approaches to meet the needs of the client and the multidisciplinary team.

Determining client need

The ability to assess multidisciplinary needs of a client will require personnel with a broad understanding of the services offered by different professions and tools that facilitate accurate assessment of client need. Whilst each profession is able to determine how best they are able to meet the client’s needs, their ability to determine the multidisciplinary needs of the client are limited. Further research is needed to develop assessment tools that accurately identify the services required by individual clients and the quantum required for each service. Tools similar to the Kolb¹¹⁹ learning style inventory could be developed to determine the type and amount of service required (Figure 3). Once automated such systems could also generate referrals and booking requests for the client. In the future, such systems could be available from the web or other smart technology (e-health, m-health) that would facilitate self-assessment by clients with complex wound needs.

Team location

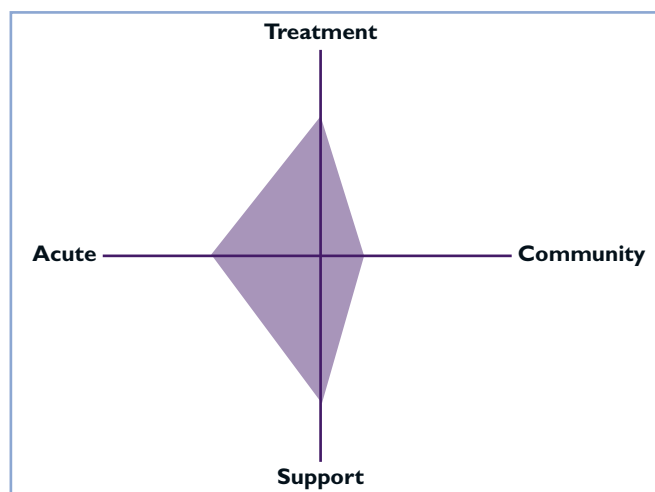
When considering the location of the team members the most obvious solution is to colocate them within a given geographic area to improve efficiency in the use of time and resources^{120–122} Colocation of the multidisciplinary team is usually structured around a centralised model of care. Multidisciplinary teams are located in large health care institutions where the various disciplines are found. Often, such institutions are located within metropolitan areas or large regional cities.

The client is required to attend the wound care centre for treatment via personal or hospital provided transportation. By locating the team close to their practice environment, limiting their travel time and the housing of resources such as wound products or investigative technologies in a single location, efficiency will be enhanced. However, such cost benefits analyses fail to consider the personal cost experienced by the client. Additional transportation cost, time lost to attend each consultation, and additional stresses incurred often impose a person cost to the client's household budget.

Recent innovations in telecommunication technology are now challenging the need for centralised services. Telecommunication technology has been available for some decades. Voice or videoconferences now readily enable team members to communicate whilst in different locations. However, it is the development of telehealth services and self-care technologies that are providing newer alternative models for multidisciplinary teams.¹²³⁻¹²⁵ Telehealth services are traditionally seen as a technology facilitated interaction between a clinician and the client while both are in different locations. However, more often, the interactions are being expanded to include clinicians caring for the client at the local location. Three-way communication between the consulting clinician, the client and the local clinician facilitates multidisciplinary practice.¹²⁶⁻¹³⁰

Technology-facilitated self-help options have exploded in recent years. Web resources or applications for smart phone technologies now provide a wealth of preventative and self-management strategies for the general public. The development of quality self help information requires the collaboration of multiple disciplines and as such is another form of multidisciplinary practice.^{117, 123, 131-133}

Figure 3. Interdisciplinary inventory diagram



Team communication

The ability for multidisciplinary teams to communicate with each other is paramount. While this can be facilitated by electronic options (e.g. email, text, voice), many authors believe that time and facilities must be found for the team to meet face-to-face on a regular basis.^{98, 99, 102, 134} Regular multidisciplinary team meetings enable differing treatment opinions to be discussed, outcomes to be assessed from multiple perspectives and the production of any future plans of care. A number of considerations for facilitating these meetings are cited in the literature. Sufficiently focused time is the most cited 'must have' for multidisciplinary meetings. It is recommended that interruptions from pagers, mobile phones, or other personnel are to be avoided during such meetings. It is further recommended that a regular time be scheduled for multidisciplinary meetings. The meetings should be seen as an integral part of the schedule of services similar to theatre or outpatient sessions. It is argued that where meetings are called on a needs basis, it is too easy to be distracted by competing needs, or to find an excuse to be excluded by personnel that do not support the model.^{102, 108, 134, 135}

Opinion is divided over including the client in the multidisciplinary meetings. If, as has been postulated, multidisciplinary care facilitates a client focus, then it would seem obvious that the client should be included. Cited advantages of including the client and their family and friends in the meetings includes their ability to add additional information to the discussion, to indicate an acceptance or not to proposed treatment strategies and to correct erroneous opinions, in addition to being able to provide insight for the client on how the team works.^{99, 101, 136} However, others argue that including the client in meetings hampers the ability of the health professionals to state their opinion frankly. Keeping the discussion at a level that does not offend the client and his/her family may reduce the productivity of the group by stifling required debate.^{99, 116} Most authors recommend a mixed approach to team composition.^{99, 116} The client and/or family should be included when relevant and excluded when warranted. However, care must be taken to avoid including the client only when information is to be imparted to them. This is a form of tokenism. It is, therefore, recommended that the client should be invited to participate in the decision-making process and be confident that their opinions are heard. Remote technologies described above provide flexible avenues to achieve this interaction.

Accessing the medical record

In association with regular meetings, it is recommended that access to the same medical record for each client by the team is essential. Paper based records are less than ideal, as they require transportation or duplication to meet the above aim. Electronic medical records (EPR) are recommended as they facilitate an “enter-once-view-by-many” approach.^{133, 137-144} When the multidisciplinary team is located in a single institution, access to EPR is often possible, but if team members are located in different institutions,

data transmission issues surrounding privacy and security may complicate access. If multidisciplinary care is to be facilitated, methods for ensuring access to a single medical record will need to be found. The development of secure ‘cloud’ or web-based data repositories may provide a solution. Equally, some of the social communication networks (e.g. Facebook) may facilitate case discussion with the added advantages of including the client and his/her family and friends.¹³⁸ Clearly more research is needed in the rapidly expanding arena.

Clinician remuneration

The issue of remuneration and multidisciplinary team function has been discussed above, but the issues of fund distribution should also be considered under the pragmatics of providing a service. If services are funded under population-based funding models, then a mechanism for fund distribution will be required. One solution is to use the multidisciplinary care plan as the criteria for remuneration. Professions providing the greater percentage of the services for the client receive the higher percentage of the funding allocated for that client. Alternatively, the client is given the funds from which they purchase services from the team following a period of consultation and plan development. Both models work best for government support services, such as the disability or palliative care schemes found in Australia. In user pay or private systems, similar distribution mechanisms could be used, but systems would be needed to deal with the tensions arising between the need to generate income and the multidisciplinary needs of the client.

Reported changes to the cost-benefit ratios

A number of studies have illustrated positive cost and client benefits from adopting a multidisciplinary approach to care. Client outcomes including lower amputation rates,¹³⁴ reduced pressure injuries¹⁴⁵⁻¹⁴⁷, faster healing

rates¹³⁶ and reduced mortality rate following trauma¹⁴⁸ are examples of outcomes achieved for clients suffering from a wound.

Organisational/financial benefits have been demonstrated across areas including infectious diseases,¹⁴⁹ pharmacy,¹⁵⁰ diabetic foot^{63, 151} and cardiac surgery.¹⁵² However cost-benefit needs to be considered equally alongside patient outcomes and efficiency of care.¹⁵² A process-orientated multidisciplinary approach can have a major impact on the efficient utilisation of resources thereby benefitting staff, the organisation and patients.⁶³ Indeed, a well-coordinated team approach has been shown to have positive effects on patient outcomes, safety, efficiency and cost-effectiveness, supporting organisational clinical activity across the service.¹⁵² The overall benefit to the health system, the staff and the patient must be considered, as cost-benefit is not always shown in the actual service or clinic but in the overall or long-term impact.

Multidisciplinary teams can be created from existing services in an organisation. By working as a team instead of a group of salaried individuals, there is no increase in cost, but the efficiencies created can provide significant savings.¹⁴⁹ Standardised treatment with clear protocols may have the added benefit of educating other staff while utilising existing expertise in a coordinated manner.¹⁴⁸

Conclusions

There are demonstrated benefits for the client, the health care institution and individual clinicians

from engaging in multidisciplinary wound care. However, in order to achieve the benefits, a number of factors would need to be implemented:

- Education about how to function within a multidisciplinary team will be required for all participants.
- Team dynamics that overcome traditional professional boundaries and hierarchies will need to be implemented.
- Team processes that facilitate group consensus whilst recognising the benefits of differing opinions will be required
- Work practices will need to change to facilitate time for focused team meetings.
- Protocols for client and family engagement will need to be developed
- Communication systems including telecommunication technologies will need to be explored and incorporated.
- Remuneration mechanisms that meet the needs of the client's while recognising the need for the health professional to derive an income will need to be designed and implemented.
- All changes are possible if the politic of the health care provider, the clinicians and the client supports the intent, and they themselves are prepared to venture outside of traditional approaches.

Universal Model for the Team Approach to Wound Care

It is obvious that a 'one model fits all' approach to building a team for the provision of wound care is unrealistic. Available resources, access to relevant expertise, remuneration provisions and patient populations will always be context-specific. It is evident however that the inclusion of key elements within wound care services will foster collaborations between different health care professionals and keep the needs of the patient in the forefront. The elements are depicted in Figure 4 and described below.

Essential to the successful provision of wound care is a model that begins with the needs of the patient. Viewing treatment options via a single professional lens will quickly identify relevant interventions but often fails to take into account the patients' goals or perceptions. A common case in point is the application of compression therapy. The professional lens clearly makes association between interstitial fluid accumulation (oedema) and the physical mechanism of increasing hydrostatic pressure via compression bandages or garments to shift the fluid to the vascular compartment. The patient lens may perceive compression therapy as an uncomfortable intervention that interferes with their normal hygiene and daily activities, resulting in a low compliance rate.¹⁵³ Formulating plans of care on patient need in preference to foci of correcting

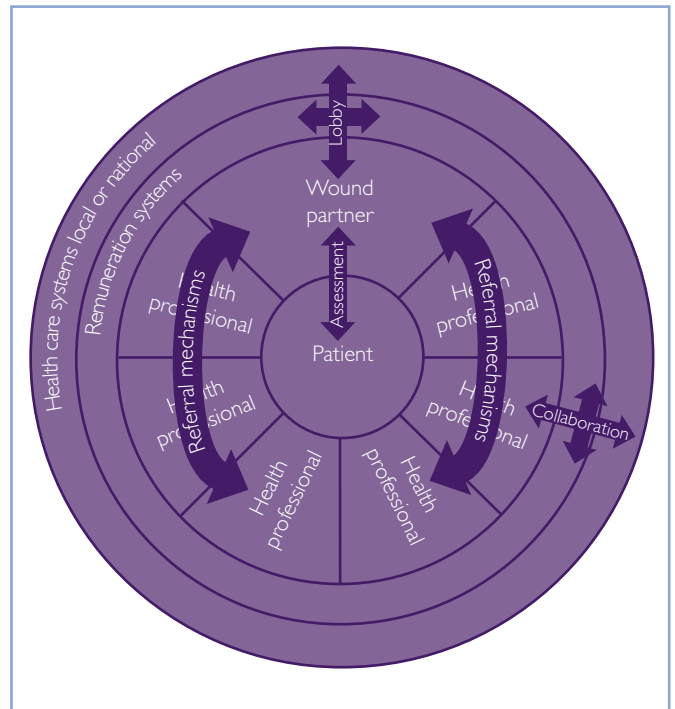
pathophysiology or psychological deficit requires a major 'mind shift'. It may mean that evidence-based treatment interventions, while incorporated, take a 'back seat' to a more imaginative life-course approach to healing wounds.

Empowering the patient in this way assumes a certain level of patient knowledge. An understanding of treatment rationales, insights into the health care system and mechanism of referral would be essential. In reality, the majority of patients are ignorant of such topics and some would prefer not to know. Conversely, a recent systematic review by Chewing et al¹⁵⁴ has shown that over time, some patients increasingly prefer to make shared decisions with their providers, though a minority still prefer to rely on providers to make the decisions around their specific care pathways.

It is clear that a patient-centred approach will require a patient advocate. For decades, midwifery has employed a 'birth partners' model that provides the patient with a voice during the childbirth trajectory.¹⁵⁵ While this system has received criticism about the 'caliber' of the birth partner, often citing poor patient choices that have resulted in negative outcomes, if care systems are to be predicted on patient perceived need, this limitation will need to be recognised and mitigated against.

The suggested model here recognises the need for a patient advocate that is able to bring together the patients' perceived needs, treatment aims and appropriate health care services into a management and care plan. Such a role is an essential element of any wound team. Wound navigators could be implemented in a number of configurations. If the model were to be completely patient driven, the patient would select their 'wound navigator'. This, however, may result in the potential negative outcomes highlighted above in the midwifery model of birth partner. The safer option would be to instigate a wound navigator model that is focused on patient perceived needs but draws from the expertise of health care professionals. Wound navigators could be formal roles created within the wound team similar to case management models used in palliative care and mental health services.¹⁵⁶⁻¹⁵⁸ This would help ensure adequate preparation of the wound navigator and enable the collection of patient outcomes data that would, over time, highlight the importance of such roles in health care policy and remuneration schemes. Equally, it could be the first health professional approached by the patient. Whilst this would require additional education for all health clinicians (e.g. roles of other health professionals, referral and remuneration mechanisms) it will help to mitigate against misconceptions arising from semi skilled or lay advice, as seen in the midwifery model.

Figure 4. Essential elements in an interdisciplinary wound care service. The patient forms the focus of the care but relies on the expertise of a wound navigator to organise wound care service via established referral mechanisms. The wound navigator and other health professionals either collaborate to explore beneficial remuneration and health care systems and/or lobby to meet the needs of the patient.



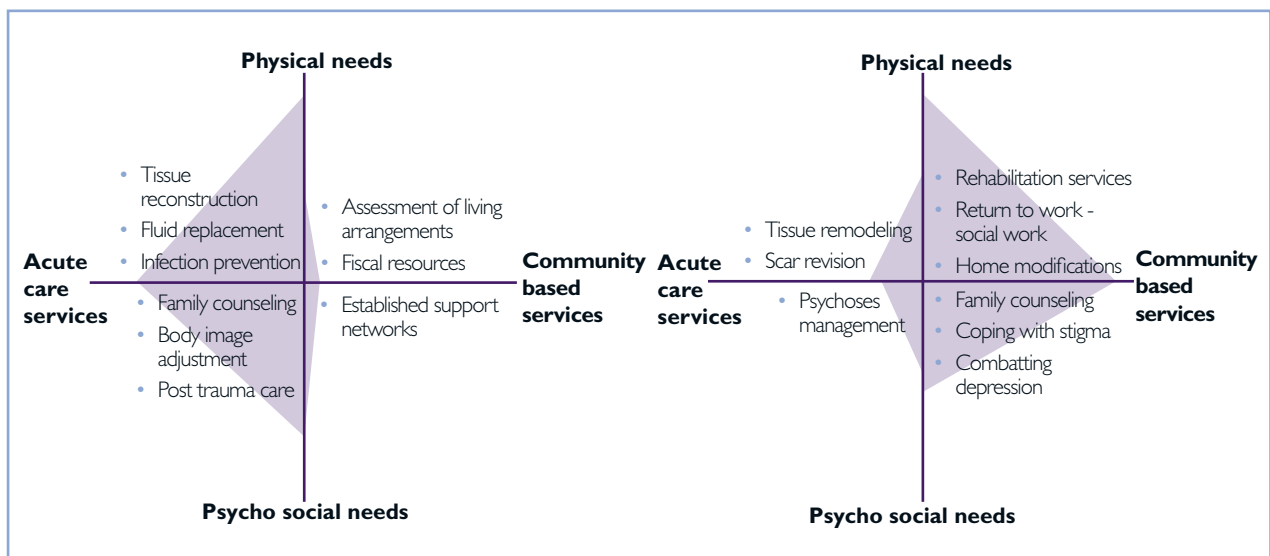
It is envisaged that wound navigators would not only advocate for individual patients, but would play an important role in lobbying for system change. As suggested above, the collection of patient outcome data resulting from the model would provide evidence that could be used to influence health policy, geographic allocation of resources and remuneration systems. This would, in turn, improve the wound management received by individual patients. Thus, the wound navigator would advocate for individual patients at the local level and for changes to wound management systems at the context level. Both levels of advocacy would need the support of other health care professionals from the wound team.

The second essential element to a wound team model is a clearly established referral mechanism. The wound navigator must understand the contribution made by individual health

professionals to the total care of a patient. This must be, in turn, complimented by referral mechanisms that recognise the contribution made by the wound navigator. Such mechanism will need to facilitate urgent review, case discussion and seamless transfer of patient records. Where such systems do not exist, the wound navigator, with support of other health professionals, would advocate for the development of the required systems, or establish informal systems until the former can be achieved. If adequate referral mechanisms are absent, the wound team model postulated cannot be implemented.

In contemporary health care systems, the selection of the participating professions for the provision of a team approach to wound care is plagued by two limitations. Firstly the selection is often based on the most pressing needs; secondly, the selection is based on the knowledge a referring clinician has

Figure 5. Graphic depiction of the needs of a patient suffering from severe burns. The graph on the left depicts the quantum of care required along both continuums during the acute phase of the healing process. The graph on the right depicts the patient's needs during the rehabilitation stage.



of the role of the health professional the patient is being referred to. Patients often describe the “run around” experienced as they are referred from one health professional to another, often ending back where their care started with no obvious benefit. The need for amalgamation of comprehensive assessment data that identifies relevant health professions and services required by the patient justifies the requirement for a wound team model.

The assessment requires a combination of patient perceived needs and known health status parameters. It was further suggested that the assessment data should be presented as a graphic representation of the quantum of various services required by the patient. Figure 6 is an example of the graphic representation suggested. It uses assessment data to plot the quantum of services required by a patient on two continuums. The first is a continuum between services traditionally described as either acute or chronic. The second is a continuum between physical and psychosocial need. It recognises that patients will often require services from all four quadrants but the quantum of each varies through out the wound-healing journey. Each quadrant would be populated with wound management services identified within a local or national level. In this way the graphic representation would not only quantify the amount of service required, it would also identified required services.

The development of such systems would enable the provision of ‘care packages’ similar to other chronic disease or disability services.^{159, 160} The bridge between existing assessment data collection tools and the graphic representation depicted are currently still in development and not readily available. However, the need for the wound team model to include a comprehensive assessment that highlights appropriate resources based on a whole of life view would be required if such a service is to be fully functional. In time, systems that quantify

the amount of each resource needed will continue to be developed and should be incorporated into such services.

The development of a patient-driven care system remuneration comprises the next essential element of the wound team model being recommended. Remuneration of health care services will be heavily influenced by the local context. Some will be a fee for service model and some will be a population-based government funded model, while others will be a hybrid of both. Regardless of the remuneration system, most are based on time-on-task (TOT) models. The health professional is remunerated based on the time they spend with a patient. As presented in the barriers discussion above, wound team care involves the use of time on patient-related matters but this time may not always be directly spent with the patient. For example, case discussions or team meetings are common exemplars. It is suggested that the formation of a wound team service will require a revision of the remuneration model. While whole system reform will require the outcomes data described above (see wound navigators), reform can also be achieved by the professionals involved at the local level. Decisions to contribute unfunded time, pooling a percentage of fees into a team care budget, and/or additional patient private contribution to additional services can and should be instigated at the local level if the wound team model is to be realised.

Another model for comparison is use of a cancer navigator, which has resulted in patient-centred improvements in coordination of services and referral patterns across the system.¹⁶¹ Another model using the navigator is the Transitional Care Model,¹⁶² which has demonstrated improvements in care coordination across settings of care for patients with high risk diseases. These models could be readily be applied to the chronic wound patient.

In the US, population health models of care that promote continuity and coordination of services include patient-centred medical homes (PCMH) and accountable care organisations (ACOs).

The PCMH promotes a continuous relationship between patients and providers to improve clinical and financial outcomes. The ACO model lies in the concept of shared savings, along with shared responsibility. Indeed, leveraging the value of primary care and empowering the patient to improve and maintain the health of a population is the centre of US healthcare reform. In these models, the primary care provider is the chief navigator.¹⁶³ Within these systems, wound care consultation support must evolve to become more nimble and accessible, with clear alignment with the primary care navigators to produce the best outcome.

Thus, cognisance of the American model described above, it is evident that the final essential element is whole of health care system reform. It is recognised that reforming the health care system is an ongoing task confronting societies. Drivers such as increasing health care demand and shrinking fiscal resources are increasingly making health care

reform an imperative. Wound care providers will need to be active participants in these ongoing reforms. Having a clear vision for effective wound management provision will be an important element of this activity. The proposed model we believe provides that vision. However, the implementation of a wound team service should not wait until such reforms are realised. Clinicians wishing to establish the proposed wound team model can make changes to their local health care system that will help achieve the benefits suggested. Simple activities such as listing available wound management services in the local area, establishing networks and documenting referral mechanisms would provide a foundation for changing the nature of a wound care service. Figure 5 is an example of a service list with referral mechanisms that could be compiled by a clinician for a local area. Creating such a repository and sharing it with other services in the local area increases the treatment options available for patients. Equally, establishing secure networks that enable the sharing of a patient medical record between identified services, and if possible co-locating service systems, is a change that will foster a wound team approach. Contemporary network repositories

Table 2. Example of a service list and referral mechanism that could be constructed by a clinician for his/her local area to facilitate their role as a wound navigator.

Wound service	Contact details	Preffered referral	Notes
Dr Ramston	Ph: 5674532 Mob: 013456 Email: g.st@woundy	Initial phone conversation with follow up letter	Quick to respond
Feet for us podiatry	Ph: 098765489 Mob: 0134567800 Email: feet@calus.com	Refferal template supplied	Wound debridement and off loading
High on you hyperbaric	Ph: 011228976 Mob: 01545454 Email: o2@breeze.com	Letter with patient details and payment status	Radiation cystitis, neuropathic ulcer service
Super star plastic surgery	Ph: 6722987 Mob: 02897867 Email: sexy@georgus.com	Letter with patient details and payment status	Scare review, surgical debridement

such as data clouds provide a number of options for sharing of professional opinions and secure patient details. Social media networks also provide options for patients to share their experiences with other similar patient cohorts, or for health professionals to seek advice from worldwide networks, vastly extending the notion of wound teams.

Imaginative use of 'ready to hand' facilities provide an avenue for exploring changes to a local health care system that can enhance wound management without having to wait for national health care reforms.

Figure 6 Example of a service list and referral mechanism that could be constructed by a clinician for his/her local area to facilitate their role as a wound navigator.

Summary

In summary, we believe that effective management of wounds as a team requires the development of five essential elements:

- A patient focus using an advocate for the patient – wound navigator

- Referral mechanisms that are responsive
- Aggregation of assessment data to form a single plan
- Appropriate remuneration systems
- A health care system sensitive to team models

Each element can be realised either via health care system reform or local collaboration. It has been suggested that clinicians interested in establishing wound team services begin at the local level by assuming the role of the wound navigator. Interested clinicians could generate a list of local services, collaborate with identified services to develop referral mechanisms, aggregate assessment data collected by the services into to a whole of system care plan, explore options for better utilisation of existing remuneration schemes to fund identified patient need and collect outcomes data that supports the benefits of the wound team approach highlighted in the literature. Over time, the local initiatives suggested have the potential to grow into a 'groundswell' of evidence that can be used to lobby government to instigate needed health care reform.

Summary and conclusion

Changing population demographics, with the predicted increase in the numbers of individuals with chronic diseases, means that there will be a corresponding increase in the prevalence and incidence of wounds into the future. Therefore, not only will there be a substantial need for wound management over the coming decades, but there will also need to be a concerted effort in developing good prevention strategies in order to reduce the unnecessary complications of chronic disease. Diabetes is an excellent example, where it is known that patient education pertaining to foot care and offloading can substantially reduce the incidence of diabetic foot ulceration, a debilitating and life threatening complication of the disease.

At the outset, adopting a team approach to the provision of wound management services seems logical as no one profession has all the skills required to address the complex needs of individuals with wounds. However, a lack of clarity within the literature surrounding the terms multidisciplinary, interdisciplinary and transdisciplinary, means that to date, no consensus exists as to what is meant by such approaches to care delivery. Therefore, it is not surprising that there have been challenges in implementing these models of care, when no one really understands what they mean, or how they should best be achieved. Indeed, throughout the literature, no definitions are provided, rather the

emphasis is on what the professionals involved in the care of the patient actually did, rather than the model of care that underpins their intervention strategies. It is for this reason that the concept “managing wounds as a team” was born, as it was felt that this concept is well understood, particularly as in other walks of life, teams are evident. The essence of the team approach in wound management is that the team is interdependent and team members share responsibility and are accountable for attaining the desired results.

Regardless of how the teams are defined within the literature, there is substantial evidence that when individual professionals come together with a shared goal that is patient focussed, enhanced clinical outcomes can be achieved. This is evident across the wound spectrum, clinical care settings and geographical locations. Furthermore, a wide variety of research designs have been employed, all demonstrating positive results. Within the literature, the sustainability of a team approach was a concern, however, due to issues surrounding reimbursement, scope of practice, and a general lack of understanding of the role of other members of the team. It is for this reason that the Universal Model for the Team Approach to Wound Care was developed. For this model to be successful, 5 elements are required, ranging from use of a “wound navigator”, to changes in referral and data collection systems and to improved reimbursement approaches.

In addition, for this to be achieved, education and training will be needed to facilitate individuals developing the skills required to work together as a team. We felt very strongly that the patient should be at the heart of all decision making; indeed, working with the model begins with the needs of the patient. To facilitate this, we suggest use of a wound navigator, who acts as an advocate for the patient.

Overall, we feel that the guidance provided within this document, serves to illuminate the importance of a team approach to wound care, and additionally provides a clear model on how to achieve such an approach to care. We look forward to developing evidence of the impact of this model of care on clinical and financial outcomes and will continue to share updates over time.

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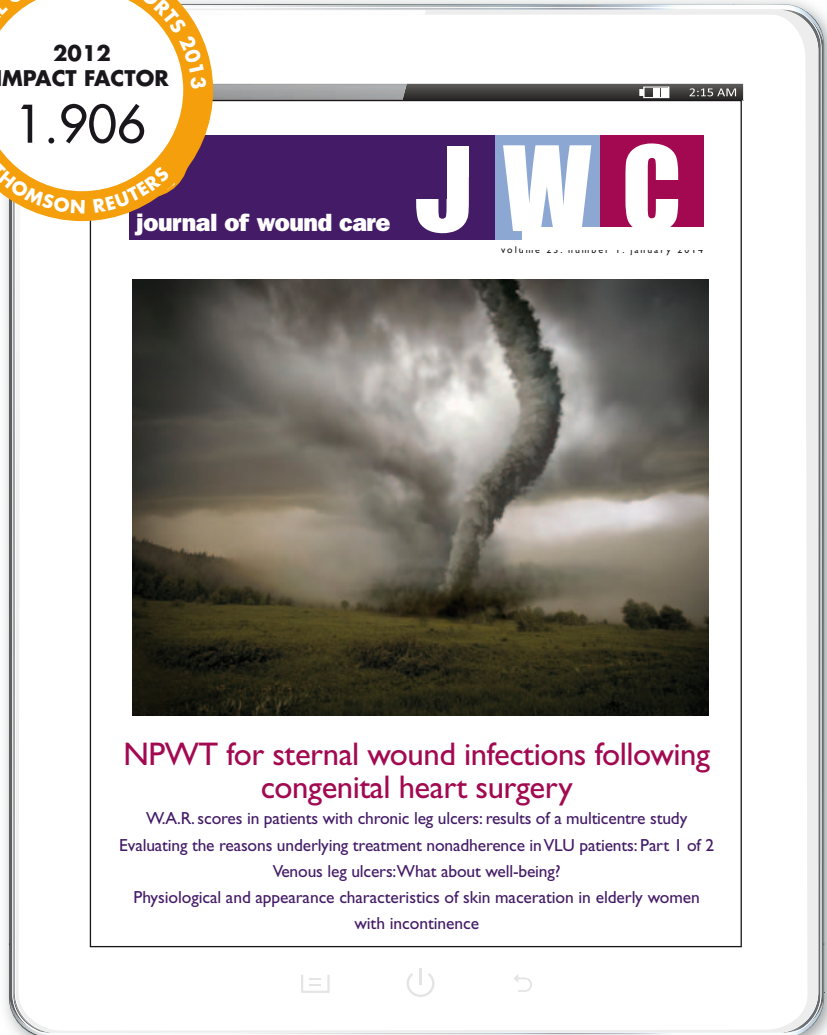
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