

CO-MORBIDITY AND THE PROBABILITY OF WOUND HEALING

INTRODUCTION

Wounds that are chronic and do not heal, can impair the quality of life of the client, are a challenge for health workers and impact the health care system. Wound healing is a dynamic process that optimally leads to restoration of tissue integrity and function. Problem wounds are those which fail to respond to standard treatment. Such wounds usually develop in people with multiple local and systemic factors, contributing to inhibition of tissue repair. These factors can impact on the probability of wound healing. It is important for nurses to work with clients to develop realistic expectations of the time required for a wound to heal.

The Royal District Nursing Service (RDNS) of SA Inc. commissioned research to explore existing wound management assessment processes and develop a guide to healing probability. The research project was conducted between November 2007 and June 2008. The purpose of the research was to validate the "RDNS Baseline Assessment Tool for Wounds" against available evidence and to develop a framework to determine expected time frames for healing of leg ulcers and pressure ulcers.

What were the intended outcomes?

The intended outcomes for the research were:

- An evidence based wound management assessment process.
- An evidence based guide to wound healing probability.
- A wound assessment tool.
- A comprehensive final report with recommendations for RDNS wound management.

To achieve these outcomes, a search for literature was conducted to scope for evidence with an aim to:

- Determine a relationship between specific co-morbidities and healing rates for leg ulcers and pressure ulcers.
- Clarify parameters of 'control' for specific co-morbidities.
- Establish consensus from peak professional bodies related to parameters for co-morbidities where evidence was lacking consensus.
- Seek evidence to validate the clinical content of the RDNS Baseline Assessment Tool for Wounds.

HOW WAS THE RESEARCH CONDUCTED?

Data collection was undertaken in two stages. Firstly, a comprehensive, integrative literature review was undertaken with a focus on co-morbidity risk factors. Secondly, aggregated RDNS client data were analysed for the month of April, 2008 (a four week period) for the purposes of profiling clients with a care indicator of pressure ulcer, venous ulcer, mixed aetiology ulcer, unclassified ulcer and arterial ulcer.

Literature Review

The purpose of the integrative literature review was to explore co-morbidity as risk factors for developing and sustaining leg and pressure ulcers. The co-morbidities under focus were: diabetes, hypertension, peripheral vascular disease, smoking, corticosteroids and chronic renal failure. The research team selected these co-morbidities because a preliminary literature review revealed that these were the factors most commonly identified as impairing wound healing.

Reports of empirical research or expert opinion, published between 1999 and 2008 and reported in English, were included in the review. Literature focused on diabetes, hypertension, peripheral vascular disease, smoking, corticosteroids and chronic renal failure as co-morbidities acting as inhibitors to wound healing of leg and pressure ulcers. A number of cohort and retrospective cohort studies looking at wound healing probabilities were conducted overseas in the United Kingdom and the United States (some involving over 75,000 participants considered to have co-morbidities related to impaired wound healing); however the studies were inconclusive and therefore were not considered as quality evidence.

The search word and phrases used were: diabetes, hypertension, peripheral vascular disease, peripheral arterial disease, smoking, passive smoking, corticosteroids, renal failure, chronic renal failure, chronic wounds, wound management and wound healing. More specific keywords and phrases were used in the latter stages of the literature search. Scrutinising the reference lists of publications to identify key texts and authors extended the search. A total of 83 publications were sourced that were considered relevant to the aims of the research.

Expert Opinion

Expert opinion and consensus was sought from a

diversity of nursing and medical experts. Three international and national wound specialists were contacted to request published or unpublished work on the subject of co-morbidity and wound healing probability. They were not aware of any such evidence. Nursing wound specialists with RDNS Victoria, Blue Care Queensland and Silverchain Western Australia were invited to share aspects of their organisation's wound assessment charts/forms. Silverchain responded revealing their project with a focus on mortality rates for clients related to the incidence of skin tears.

Stage 1 Findings: What did the evidence show?

Evidence validated the content and intent of the RDNS Baseline Wound Assessment Tool, including wound classification, wound staging, wound history, factors that may impact or impair wound healing, client's expectations regarding their wound (in client's own words) and a complete leg ulcer assessment tool^{1,2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21,22.}

Much of the literature discussed 'poor control' of chronic conditions but failed to describe limits or define what poor control was^{23,24,25,26}. Conversely, 'risk' was described by the number of years a person had a chronic condition; however there was no mention of how the chronic condition had been managed by the person over that time. 'Optimising treatment' appeared throughout some published literature in relation to reducing risk factors which affect wound healing; however specific treatments were not examined. There was no evidence to demonstrate the relationship between severity of disease and the impact on wound healing.

There was evidence to suggest a relationship between multiple co-morbidities and impaired wound healing. However, published evidence to show definitive wound healing time frames for clients with multiple co-morbidities could not be found, in terms of days or weeks^{4,2,11,16,28,29,30,31,32,33,34,35,36,37,38,39,18,40,41}.

The Search for a Probability Tool

A definitive tool to measure both lifestyle and co-morbidity incidences that impair wound healing could not be found. Hence, recommendations were made to re-focus the research to:

- Acknowledge gaps in evidence relating to wound healing probability and common co-morbidities for people with pressure or leg ulcers.
- Explore Australian standards definition of 'controlled or well managed' status for specific co-morbidities relating to wound healing common to RDNS clients with pressure and leg ulcers. This data may assist to inform parameters for risk assessment of clients with a pressure ulcer or leg ulcer. Co-morbidities such as diabetes, hypertension, peripheral vascular disease, smoking, corticosteroids and renal failure were deemed to be relevant to this project as they were the most commonly identified co morbidities linked to impaired wound healing.
- Request RDNS data relating to current clients with a current leg, pressure ulcer or unclassified ulcer (including all medical diagnoses) who were referred for wound management services over a 12 month

period, to potentially uncover trends or anomalies related to time of healing for ulcers and for diagnosis verses healing rates.

- Investigate the RDNS clinical outcome measure report for venous leg ulcers. Within the last 12 months (March 07 – end of Feb 08) 58% of RDNS clients with a venous leg ulcer healed within 84 days, 12% above the Department of Veterans Affairs standards, an external benchmark for RDNS since 1998.

Stage 2 Findings: Client Profiling

RDNS data were analysed for the month of April 2008. A total of 874 clients had a care indicator of pressure ulcer, venous ulcer, mixed aetiology ulcer, unclassified ulcer and arterial ulcer were referred to RDNS for clinical assessment and care. Average age at admission for these clients was 73.4 years. The average age for clients over 65 years was 79 years and the average for client under 65 years was 54 years. The percentage of clients over 65 years was 81% (or 708/874) and the percentage of clients under 65 years was 19% (or 166/874).

The care indicator with the highest prevalence was pressure ulcers at 42%, followed by:

- venous ulcers 22%
- mixed aetiology ulcers 19%.
- unclassified leg ulcers 10%
- arterial ulcers 7%.

Of this client group, 33% (or 285 /874) clients referred had diabetes, 9% (75/874) had peripheral vascular disease and 4% (35/874) had renal failure. These are all known co-morbidities that inhibit wound healing. Smoking is also a co-morbidity that inhibits wound healing, however the smoking status of clients is not recorded in the RDNS database.

The incidence of the combinations of co-morbidities known to inhibit wound healing for the 874 clients were:

- diabetes and renal failure 16/874 or 2%
- diabetes and peripheral vascular disease 31/874 or 4%
- renal failure and peripheral vascular disease 3/874 or 0.3%
- diabetes and circulatory complications 88/874 or 10%
- diabetes, peripheral vascular disease and renal failure 11/874 or 1.25%.

Data Analysis

Analysis of client co-morbidity data reveals healing rate probability to be within expected timeframe for healing of leg ulcers, as benchmarked with the Department of Veterans Affairs (DVA). Associated co-morbidities such as smoking, which is a known contributor to the impairment of wound healing, and other factors such as client lifestyle and environment, are not recorded. Evidence of co-morbidities related to leg and pressure ulcers does not discuss high, medium and low risk categories, however measurable parameters, based on evidence and consensus statements, have been found

and are included in the table below. A consensus statement is a document that represents the collective opinion of a convened expert panel⁴¹.

Measurable parameters that inhibit healing

Diabetes	PVD	Smoking	Chronic Renal Failure
Fasting BGL > 6 mmol or HbA1c > 7%	ABPI 0.9 – 1.1 is 'normal', all readings above or below require further assessment	Daily current smoker of tobacco	Stage 2-5
Parameters based on evidence 43,9,10,44 ,28 ,29	Parameters based on Consensus from the Royal Australian College of Surgeons	Parameters based on evidence 45,46,47 ,48,49 ,3 4 and statements from QUIT SA.	Parameters based on evidence 50, 51, 17, 52,

DEVELOPMENT OF A TOOL

The RDNS Baseline Assessment Tool for Wounds was updated to differentiate between co-morbidities with measurable parameters for which there is strong evidence of impairment to healing and those co-morbidities which may inhibit healing but for which there is less rigorous evidence or parameters. Evidence was found that reflected four main co-morbidities that will impair wound healing, and must be considered by the nurse when setting goals with the client related to wound healing probability. These are: uncontrolled diabetes, renal failure, smoking and the presence of peripheral vascular disease. When a nurse works with a client to assess wound healing, if any of those co-morbidities are present, wound healing will be inhibited, resulting in the wound having a prolonged healing of time of up to or more than 12 months. Sometimes healing will not be achieved. When healing is not likely to be achieved, the nurse and the client need to set realistic goals for management of the wound. These might include exudate management, pain management and discussion around living life with a chronic wound. Here too, issues such as altered body image and depression may be apparent.

A section entitled 'Peripheral Vascular Disease Severity Index' was included on the Baseline Assessment Tool for Wounds to prompt the nurse to document the ABPI reading and consider the degree of peripheral vascular disease that may exist for the client. The index was based on conservative measurements (severe, moderate, mild, none, calcification) of ABPI results as described in the literature^{25,31,32,52, 53, 54, 55, 56} and further confirmed by the Royal Australasian College of Surgeons.

A New Tool

There was little evidence about how lifestyle and co-morbidities affect the healing time of wounds and how the nurse and client can set realistic goals or expected outcomes for care. A new tool was developed to assist nurses and clients to determine wound healing probability based on the evidence (refer to insert).

There are four main co-morbidities that will inhibit

wound healing; poorly controlled diabetes, peripheral vascular disease, smoking and chronic renal failure. A traffic light analogy was used to identify these four co-morbidities in red on a healing probability tool to indicate a time-frame for wound healing as 'prolonged or unlikely to heal, up to 12 months duration or longer'. Other co-morbidities that may inhibit wound healing were entered in orange to indicate the wound is 'likely to heal, 3-12 months duration'. Evidence also uncovered factors that aid healing so these are indicated in green.

The 'Wound Healing Probability Tool' can guide the nurse and client to set realistic goals and discuss a timeline for potential healing. The 'Wound Healing Probability Tool' can also be used as a visual aid for the nurse to offer education to the client in terms of positive lifestyle choices or used as a prompt for referral to other agencies to seek health information. The flip side of the tool provides community referral points for nurses.

UNINTENDED OUTCOMES

It was discovered that smoking, as a main co-morbidity inhibiting wound healing, was not data collected by nurses at point of admission or throughout a client's episode of care or entered into the RDNS database. Hence a recommendation is made to establish an informatics process and nursing education for the collection of data related to the incidence of smoking for all clients.

LIMITATIONS

The primary studies included in the literature review gathered data from people in diverse situations, circumstances and environments, using diverse analytical approaches and theoretical perspectives. Integrating studies that have used diverse methods and sample sizes into a coherent whole has involved the drawing inferences by the authors. Client data may also not be absolutely reliable.

CONCLUSION

For most people, wounds will heal in a timely manner, but for some clients wound healing can be prolonged, requiring complex interventions and specialised skills. There are a small number of clients for whom healing might not be a realistic outcome and RDNS nurses work with these clients to manage their wound over a prolonged period.

Assessment of wound healing probability and understanding client expectations is fundamental to client satisfaction with care. The assessment process undertaken by RDNS nurses in collaboration with a client and family creates the opportunity to learn more about the individual, their circumstances, experiences, perspectives and expectations. Determining the client's expectations for healing probability during the assessment process creates a foundation upon which the client and nurse can discuss principles of health promotion that impact upon wound healing.

RDNS (SA) is a leader in community nursing care and research has taken the first step in unearthing the gap in wound healing probability. The next step is to validate the tool in clinical practice.

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