WoundsWest: Delivering comprehensive strategies to improve wound management in Western Australian Health Services

Prentice JL, Strachan V, Carville K, Santamaria N, Elmes R & Della P

Abstract

It is well known that prudent, supported, early discharge of patients back to their home environment facilitates recuperation, rehabilitation or palliation. Patients with wounds are no exception to this.

The provision of effective ambulatory wound care is gaining increasing attention and importance worldwide as health services seek to provide efficient and effective services to growing numbers of patients with wounds, often under burgeoning fiscal constraints. The lack of, or poor utilisation of, evidence-based clinical practice guidelines and protocols for wound care and inequities in terms of access to resources, whether wound dressings or education, are causal factors leading to inconsistencies in the clinical management of wounds that contribute to less than optimal outcomes for patients with wounds.

Health services and health managers' ability to strategically plan and rationalise wound management services is often further hindered by a lack of data on the epidemiology and potential burden of acute or chronic wounds within and on local or state health services. Furthermore, where there is an absence of clinical governance in relation to wounds, these wounds are not subject to the same scrutiny as other medical conditions and, therefore, opportunities to improve service delivery in relation to wound management are missed.

This article describes a tripartite and multidimensional approach to providing West Australian public health services and employees with a sustainable system for the prediction, prevention and management of wounds. WoundsWest (WW), a partnership between WA Department of Health (WA Health), Silver Chain Nursing Association (Silver Chain) and Curtin University of Technology (Curtin University) is a novel, 6-year project and a first for Australia. WW aims to facilitate clinical governance of wounds within health services, enhance clinicians' knowledge, skill and competence in wound management, improve clinical outcomes for patients with wounds and increase health services' ability to decrease the burden of wounds in Western Australian public hospitals.

In order to achieve these aims, WW established a number of subprojects to ascertain the prevalence of wounds within WA public hospitals, improve access to educational resources for wounds, improve access to expertise in wound management and provide a repository for wound-related data for the purpose of ongoing research.

Introduction

WoundsWest: The vision

The genesis of WoundsWest (WW) was multifactorial as large projects often are. In 2006, Dr Shirley Bowen, director of Ambulatory Care, North Metropolitan Area Health Service West Australian Department of Health (WA Health) contacted key individuals in WA with an expressed interest in wounds (Santamaria, Prentice and Carville) to discuss investigating pressure ulcer prevalence in West Australian (WA) hospitals; the aim being to reduce the overall prevalence of these wounds, particularly hospital acquired prevalence. Coincidentally, the PRIME Consortium (Santamaria, Prentice and Carville) had been commissioned by Dr Phillip Della, then chief nursing and midwifery officer for WA Health and the Office of Safety and Quality, to undertake a literature review describing the problem of pressure ulcers in Australian healthcare settings with a view to improving pressure ulcer prediction and prevention in WA. Following further discussion between all parties, it was agreed that duplication of effort should be avoided. Secondly, it was identified there was a dire need to simultaneously categorise and quantify the burden of wounds within WA's public hospitals as other wounds, not just pressure ulcers, impact on patterns of episodes of care, inclusive of length of stay and movement between public and other health services, all of which have connotations for

health service planning, costs of care and resources required to manage patients with wounds.

Dr Bowen submitted a proposal for a 3-year statewide programme for wound management to be known as 'WW' to the WA Health State Health Executive Forum (SHEF), which was duly accepted in November 2006.

WW is a partnership between WA Health, the Silver Chain Nursing Association (Silver Chain) and Curtin University of Technology (Curtin University) under the auspices of Public Health, Ambulatory Care and Chronic Disease Management Reform, North Metropolitan Area Health Service. While sanctioned initially as a 3-year project, WW was expanded into a 6-year project in November 2008 and will now conclude in October 2012. Financially, WW is supported by an annual budget of approximately $1m; $850k from WA Health and $150k from the Chief Nurse and Midwifery Office.

Silver Chain and Curtin University provide in-kind support through personnel and physical resources to each of the subprojects. For instance, Silver Chain has facilitated the hiring of project staff, the use of mobile phone audit tool technology, hosting of wound prevalence survey data, use of education materials on wounds, validation of the STAR Tool during wound prevalence surveys and establishment of the 1300 WOUNDS Call Centre for the WW Advisory Service.

Curtin University has provided temporary accommodation for project officers, third-year nursing students for two wound prevalence surveys and access to media students who assist with the development of interactive animations fundamental to the development of WW's online education programme.

Dr Jenny Prentice *
Project Director WoundsWest,
Public Health and Ambulatory Care,
Department of Health Western Australia
54 Salvado Road Wembley WA
Tel: 08 9380 7720
Fax: 08 9380 7730
Email: Jenny.Prentice@health.wa.gov.au

Veronica Strachan
Program Manager National Health Workforce Taskforce, Melbourne VIC
(Project Director WoundsWest, November 2006 to December 2008)

Keryln Carville RN, STN (Cred), PhD
Assoc Professor Domiciliary Nursing
Silver Chain Nursing Association & Curtin University of Technology

Professor Nick Santamaria
Chair of Acute & Ambulatory Care
School of Nursing and Midwifery
Curtin University of Technology

Ros Elmes
Executive Director Public Health and Ambulatory Care, Department of Health Western Australia,

Professor Phillip Della
Head of the School of Nursing and Midwifery, Faculty of Health Sciences, Curtin University of Technology

* Corresponding author

Concept and philosophy of WW

The initial concept, philosophy and underlying objectives of WW were to broadly: examine the epidemiology of wounds in WA public hospitals; introduce an online education programme on wound management; establish a longitudinal electronic patient record encompassing digital images of wounds; and to establish a data repository.

The philosophy and rationale behind these objectives was the perceived absence of any overarching sense of accountability for, or clinical governance of, wounds within WA Health, based on the following factors:

- The epidemiology, classification and number of wounds and their effect on health service delivery was unknown in WA.
- Fragmented wound management due to poor continuity of wound care and variations in clinical practice between clinicians and across health jurisdictions.
- Equity and access to wound care, wound care products and pressure reducing or relieving devices differed between metropolitan and country health services.
- Wound healing rates are not tracked, benchmarked or accurately costed.
- Wound management education and clinical guidelines are not readily accessible to all clinicians.
- Inappropriate use and wastage of clinical resources such as dressings, devices and diagnostic investigations.

- Wound documentation systems lack uniformity among health services.
- Few health services applied national patient safety and quality indicators for preventable wounds such as pressure ulcers and skin tears.
- Wound research locally was hampered by the lack of available data.

Individually and collectively the above factors lead to poor patient and health service outcomes, which affect the broader WA and Australian communities at large.

Whilst some descriptive data exists pertinent to wounds in WA public health facilities data collected relates to specific wound categories such as pressure ulcers [1-4], leg ulcers [5], burns [6] or skin tears [7]. Prior to the WW wound prevalence surveys no data described the burden of wounds within WA public health facilities upon which comprehensive strategies for statewide improvements in wound care could be based.

Australian research has demonstrated that the implementation of clinical practice guidelines and standards for wound management, education and remote referral, coupled with evidence-based wound management, can reduce the prevalence of wounds, improve healing outcomes and reduce costs. In 2000, Prentice demonstrated the effectiveness of implementing clinical guidelines in conjunction with an intensive education programme in reducing pressure ulcer prevalence in selected tertiary hospitals across Australia [8]. In Victorian public hospitals, pressure ulcer prevalence was reduced by 30% through the implementation of recommendations arising from three consecutive annual prevalence surveys [9-11]. Similarly, the PRIME Consortium's multi-centred study across Australia, using guidelines, education and digital imaging of pressure ulcers obtained a 40% reduction in pressure ulcers in residential aged care facilities [12]. These same principles, when applied to the management of patients with neuropathic foot ulcers in the Kimberley region of WA, plus remote staff having access to a nurse consultant with expertise in wound management, led to a significant decrease in lower limb amputations when compared to a control group [13].

WW sought to translate the experiences and evidence from these studies into a statewide initiative aimed at improving individual clinicians' and health services' ability to better manage patients with wounds. By using an integrated approach of auditing the magnitude of wounds, online education, electronic referral and advice and providing a pool of data for ongoing research purposes, WW would provide WA Health with sustainable strategies for improving the delivery of wound management services.

As a result, WW and WA Health would expect, over time, to see a number of improvements inclusive of reduced rates of iatrogenic pressure ulcers and skin tears, improved equity and access to wound management resources, reductions in inappropriate transfer, presentation and admission of patients with wounds to tertiary facilities through better community management and improved wound healing outcomes. Such improvements, if realised, would contribute to a reduction in the overall burden of wounds and reduce health service expenditure on wounds that could be redirected to other areas of health service need in WA.

Project aims and objectives

The WW project aims to provide:

1. Healthcare practitioners in WA with an evidence-based, sustainable, statewide system for the prediction, prevention and management of wounds to provide optimum patient and health service outcomes.
2. Health consumers and the community with information on wound management in WA.

Furthermore, WW aims to reduce the burden on hospital inpatient and outpatient wound-related services by:

- Improving access and equity to evidence-based wound management education and clinical guidelines.
- Influencing the reduction in the prevalence of preventable wounds, such as pressure ulcers and skin tears.
- Demonstrating the improved use of evidence-based wound prevention and management guidelines,
- Establishing minimum competency levels in wound management.

In order to achieve the above aims the project was divided into four subprojects (A, B, C & D), which synthesise the main components, objectives and deliverables of the project:

A. Survey: Undertake three, annual wound prevalence surveys of patients within the WA public health sector inclusive of remote and rural facilities.

B. Education: Development of online, evidence-based education programmes, clinical guidelines and the provision of clinical support for health professionals managing patients with wounds

C. Information technology (IT): Development of an advanced digital wound imaging and documentation system, which allows remote electronic referral and consultation that interacts with multiple healthcare providers.

D. Data repository: Establish a centralised data repository for storing WW data.

The specific objectives of each subproject are identified in Table 1.

Project methodology

The WW project methodology is founded on a collaborative 'Plan – Do – Study – Act' approach (Shewart/Deming Cycle) [14].

Planning: has involved the development of project plans for each subproject that clearly articulate the scope, inclusions, exclusions, assumptions and outcomes for each component of the project. In addition, service agreements between each of the partners have been established to identify partner contributions to WW.

Doing: relates to the implementation of each of the subprojects project plans in a timely manner in accordance with project timetabling to achieve stated objectives and deliverables.

Studying: has involved the reassessment of project processes and examination of the results or outputs or effect of each subproject on achievement of individual subproject or overall WW aims and objectives.

Acting: requires revision of project processes based on lessons learnt.

Yearly subproject reports identify significant milestones, activities to be completed and make recommendations for forthcoming activities. Towards the conclusion of the project, an evaluation of each subproject and WW as an integrated system will be completed and widely disseminated.

Project plan

Critical to the successful outcome of any project is the creation of a comprehensive project plan. A project plan establishes project frameworks and guides facilitation, implementation and control of a project through planned methodical processes.

The WW project director was responsible for developing WW's project plan, which was subsequently endorsed by the executive sponsors, WW Advisory Committee and working group chairpeople. The inaugural WW project director was Mrs Veronica Strachan from November 2006 to December 2008.

The WW project plan broadly:

- Details the scope, planning, implementation and deliverables of the project.
- Establishes a common understanding of the project objectives and deliverables.
- Establishes resource requirement and commitments.
- Identifies project control mechanisms.
- Clarifies responsibilities, accountabilities and authorities' of those involved in the project.

Table 2 provides a generic time line in which to achieve the elements of the project plan, while Table 3 contains a comprehensive outline of the project by project stage, major tasks, governance structure and milestones to be achieved for the first three years of the project. Additional information on the project outline can be viewed at www.health.wa.gov.au/woundswest

The project plan also addressed a number of other vital project considerations such as: assumptions; exclusions; constraints; budgets; communication; and change or risk management, quality and clinical governance processes.

Project governance

Good project governance is essential no matter how small or large a project is. WW required a governance structure that would ensure the project was well designed, would meet agreed time lines, would remain within budget and would be evaluated and reported on in accordance with WA Department of Health's *Clinical Governance Framework*.

Considerable discussion occurred around the issue of governance to ensure the above parameters would be catered for as well as ensuring governance was representative of: WW's partners; local leaders in wound management; public, private and residential aged care facilities inclusive of WA country health services; Indigenous communities; safety and quality organisations; and the WA community. The following structure incorporating executive sponsors, an Executive Steering Group (ESG), Advisory Council, project director, project team and survey, education, IT and data working groups, supported by project officers was agreed upon (Figure 1).

Table 1. WW Subproject Objectives.

Subproject	Objectives
A. Survey	To develop and use a sustainable audit methodology, inclusive of tools, protocols and data analysis to: • Determine the prevalence of all major wound categories in West Australian acute public health services at various time intervals and to explore similar opportunities in community and residential services and general medical practices. • Assess the competency of audit surveyors. • Facilitate the conduct of a pilot study to assess the efficacy of all audit methods, tools and processes. • Develop data management processes. • Facilitate analysis and reporting of valid and reliable prevalence data to inform strategic planning and clinical practice. • Investigate methods of auditing the implementation and effectiveness of evidence-based wound management. • Investigate methods for determining the cost implications of all wound categories.
B. Education	To inform health consumers, health professionals and the community and to assist health services to reduce preventable wounds and adverse wound management outcomes of all wound categories by: • Developing or modifying existing evidence-based guidelines for the prediction, prevention and treatment of all major wound categories (acute, burns, leg ulcers, malignant, pressure ulcers and skin tears and other wounds). • Establishing minimum competency levels for wound management, modelled on the evidence-based guidelines. • Developing a process for clinical support to registered and unlicensed health professionals using evidence-based guidelines, electronic consultation and digital imaging. • Developing information on wound prevention and management to health consumers and the community to enable informed decision-making and improve health outcomes. • Disseminating the material noted above in an online format.
C. Information technology	To develop and deploy a statewide wound imaging and documentation system to: • Provide an advanced digital wound imaging and documentation system to track and report wound healing rates. • Electronically document wound assessment, treatment provided and clinical outcomes. • Provide a system for electronic expert wound consultation. • Develop and support the information technology needs of the survey and education subprojects of the Project.
D. Data Repository	To establish a data repository to: • Investigate data requirements for each project component. • Identify the appropriate indicators and benchmarks required to monitor and manage the data collection. • Identify methods to collect, manage and analyse such data, including compliance with relevant WA Health information management data policies and legislation. • Advise and direct project officers in the identification, collection, management and analysis of such data. • Advise and assist project officers in the presentation and dissemination of such data. • Support the publication of article(s) on the results of these activities.

Figure 1. WW Governance Structure

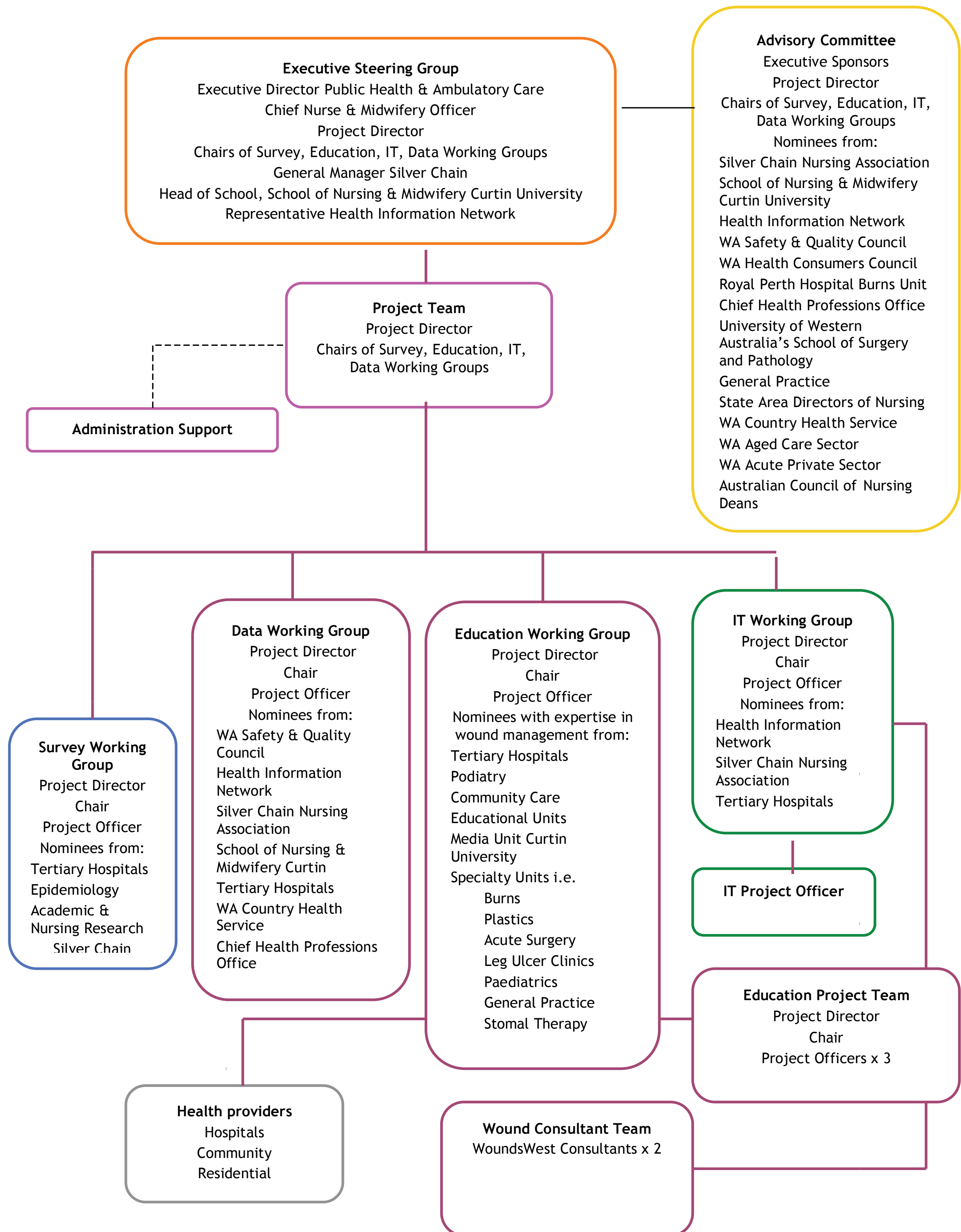

Table 2. Generic Time line WW Project Year 1-3.

Component	Year 1 (2007)	Year 2 (2008)	Year 3 (2009)
Survey	Baseline measurement Pilot & statewide survey	2nd statewide survey	3rd statewide survey
Education	Develop & implement evidence-based guidelines, clinical decision support algorithms & patient education. Education & competency assessment.		
Information Technology	WW server Imaging system design & trial	Fully implement WWt IT Commence roll-out to sites	Roll-out to remaining sites
Data	Develop platform and processes to host WW data		

ESG

Membership of the ESG is composed of the executive director of Public Health and Ambulatory Care North Metropolitan Area Health Service and the Chief Nurse and Midwifery Officer, who function as executive sponsors on behalf of WA Health. Other members are the project director, representatives of Silver Chain and Curtin University as WW partners and chairpersons of the survey, education, IT and data working groups. Other members can be seconded as required.

The role of the ESG is to oversee and provide strategic direction to the project inclusive of, but not limited to:

- Strategic decision-making and facilitation of the delivery of specific project tasks where required.
- Endorsing documents, products and recommendations from the project team related to key stages of the project.
- Managing processes within and between the Department of Health, the ESG, the Advisory Committee and the Director General and the WA Minister for Health.
- Identifying potential risks or barriers to the development and implementation of the project.
- Communicating the progress of the project to the broader community.

The ESG is accountable to the WA Director General of Health through the Chief Nursing & Midwifery Officer and to the Area Chief Executive North Metropolitan Area Health Service through the Area Executive Director Ambulatory Care.

WW advisory committee

The functions of the WW Advisory Committee, an interdisciplinary committee of clinical experts, directors of nursing, university deans, other health sector and community representatives are to:

- Provide governance to the project and specifically to advise the survey, education, IT and data working groups.
- Provide a forum for collaboration and cooperation between all health professionals and health consumers involved in the project.
- Facilitate collaboration between research, education, clinical practice and health promotion in relation to the project.

The Advisory Committee meets quarterly and is accountable to the WA Director General of Health through the Chief Nursing and Midwifery Officer.

Project director

The project director controls all aspects of the project on a day to day basis from conception to finalisation and evaluation of the project and, is responsible for milestone reports, project deliverables, staffing and budget accountability.

Project team

The project team, which meets fortnightly, comprises the project director and chairpeople of the working groups. Overarching responsibilities of the project team are the provision of:

- Expert advice and recommendations on the project on a regular basis to the ESG and Advisory Committee.

- A forum for collaboration and cooperation between all subproject working groups (survey, education, IT and data).
- Opportunities for consultation, communication and engagement with internal and external stakeholders to develop and achieve the best possible outcomes for the project.

Subproject working groups

Working groups were convened to oversee the design, planning, implementation and evaluation of the survey, education, IT and data repository subprojects and to provide expert interdisciplinary advice to the project team, ESG and Advisory Committee. Each working group has an appointed chairperson, who works closely with the project director and assigned project officers to facilitate the daily work processes of each subproject (Figure 1). All working groups have formalised terms of reference and are responsible to the ESG.

Working group membership was interdisciplinary broadly representative of clinicians, academics, researchers, health informatics and epidemiologists.

The function and outputs of the survey and education working groups are highlighted in other articles within this issue of the journal.

WW advisory service

A subcomponent of the IT process was the establishment of the WW Advisory Service (WWAS). The service, manned by consultants with expertise in wound management, would facilitate electronic referral for advice on wound management from WA health staff. Currently the WWAS is being piloted within six WA country health services. Staff in these services can access the WWAS by dialling 1300 WOUNDS, which routes the call to a call centre hosted by Silver Chain. Access can also be gained through the WW website. The purpose of the pilot is to test internal functionality of the service.

Table 3. Project overview: Years 1-3 by stage, major tasks, governance and milestones achieved to date.

Stage	Major tasks & milestones	Completed by
Year 1	**(note – project year is November to October)**	
	Appoint director	Nov 2006
	Establish Advisory Committee	
	Launch project	
1	A. Pilot wound prevalence survey.	Mar 2007
	B. Education planning and priority setting.	
	C. Scoping and development of technical specifications for IT needs.	
2	A. Review of pilot survey data and methodology.	Apr 2007
	B. Development of educational material for surveyors.	
	B. Recruitment of education project officers.	
3	A. Statewide wound prevalence survey 1.	Jun 2007
	B. Development of educational material for core wound module.	
	C. Development of detailed IT business model & technical specifications.	Aug 2007
4	A. Analysis and reporting of survey 1 data.	Sep 2007
	A. Investigate methods for determining cost implications of prevention and management of wound categories.	
	B. Roll-out of core wound education module.	Oct 2007
	B. Development and roll-out of educational material for wound categories 1 & 2 and commence development of educational material for wound categories 3 & 4.	
	C. Development of recommendations for end-user devices.	
	C. Contract with IT vendor in place.	
	C. Commence development of wound imaging and remote referral software modification.	

Table 3 (cont.). Project overview: Years 1-3 by stage, major tasks, governance and milestones achieved to date.

Stage	Tasks	Milestone
Year 2		
5	A. Development of recommendations for other health sector data collection (community & residential).	Dec 2007
	A. Investigate methods to audit implementation and effectiveness of evidence-based wound management.	
	B. Recruitment and associated process development of WW wound consultant team (WWCT).	
	C. Purchase and commissioning of WW server.	Jan 2008
	C. Limited trial of wound imaging and documentation remote referral software.	Mar 2008
6	A. Statewide prevalence survey 2.	May 2008
	B. Roll-out of educational material for wound categories 3 & 4 and development of educational material for wound categories 5 & 6.	
	B. Induction, training and trial of WWCT process.	
	C. Review trial & plan for initial roll-out of wound imaging and documentation remote expert referral system.	
	C. Commencement phase 1 roll-out of wound imaging and documentation remote expert referral system.	Jun 2008
7	A. Analysis and reporting of survey 2 data.	Sep 2008
	B. Roll-out of educational material for wound categories 5 & 6. Development of education materials for wound categories 7 & 8.	
	B. Roll-out of WWCT process.	
	C. Review initial roll-out and plan for Phase 2 roll-out of wound imaging and documentation remote expert referral system.	
	D. Investigate data repository.	
Year 3		
8	A. Statewide prevalence survey 3.	May 2009
	B. Roll-out of educational material for wound categories 7 & 8.	
	B. Review and refine WWCT process.	
	C. Complete phase 3 roll-out of wound imaging and documentation remote expert referral system.	
	C. Development of recommendations for other sector roll-out (community & residential).	
9	A. Analysis and reporting of survey 3 data.	Sep 2009
	B. Evaluate WWCT process and development of recommendations for maintenance/ongoing programme.	
	C. Evaluate wound imaging and documentation remote expert referral system and development of recommendations for maintenance/ongoing programme including usage data.	
10	Finalisation and handover of project deliverables and/or ongoing processes to maintenance teams/departments.	Oct 2012

Evaluation of wound healing outcomes will be the subject of a larger longitudinal study should the Service be implemented across WA Health.

Project outcomes

WW has successfully met many of its project deliverables as identified in Table 3. Three statewide wound prevalence surveys have been undertaken. The online education programme is well advanced, with the launch of a core wound module and modules for pressure ulcers, burns, foot ulcers and skin tears. Planning for other education modules is well advanced. Advances have also been made with respect to the IT subproject, with the piloting of wound imaging processes, the WWAS and development of IT procurement plans. The data working group is developing objectives to govern management of the data repository.

Unintended project outcomes relate to: requests to use the prevalence survey methodology; requests for didactic education and linkage to WW education programme by other sectors internal and external to WA; and the receipt of $2.5m in federal Pathways funding to implement a statewide mattress replacement programme to name a few.

Following a collaborative research project with Murdoch University that identified deficits in Aboriginal health workers' (AHWs) knowledge and clinical practice of wounds, WW has embarked on a project to develop didactic and online education modules on wound assessment and management for unlicensed AHWs. Both programmes are aimed at improving the knowledge, skill, competence and confidence of AHWs in providing care to patients with wounds. The programmes developed will be trialled in registered training organisations, providing education to prospective AHWs.

Summary

WW is a large and dynamic project. WW's ability to meet its identified objectives to date is the result of many factors; primarily adherence to a comprehensive project plan, strong executive and partner support, clear roles and responsibilities for all project groups, enthusiasm and dedication of all project staff and an understanding of known project risks and assumptions. Another fundamental factor has been the outstanding support of WW by WA clinicians and health services.

The need for good clinical governance of wounds within health systems will continue to grow as demands on health services and finite resources increase. WW is providing WA Health with concrete strategies to reduce the burden of wounds within WA. Health executives and clinicians need to avail themselves of these resources and ensure the implementation of evidence-based wound management protocols are adopted universally.

Effective clinical governance in wound management has been shown to reduce variations in clinical practice, reduce health costs and improve wound healing outcomes and the quality of life of patients with wounds.

Acknowledgements

WW wishes to acknowledge all WA Health, Silver Chain and Curtin University staff, the WW Advisory Council and working group members who have contributed to the successful development and implementation of the WW project.

Special thanks to Mrs Veronica Strachan, project director, November 2006 to December 2008 for her exceptional project management skills.

References

1. Young J *et al.* A study on the incidence of pressure ulcers in the acute orthopaedic setting. Primary Intention 2000; **8**(4):142-147.
2. Morey P & Porock D. A quality improvement survey of pressure ulcers at a tertiary teaching hospital. Primary Intention 1997; **5**(2):18-25.
3. McGowan S, Hensley L & Maddocks J. Monitoring the occurrence of pressure ulcers in a teaching hospital: A quality improvement project. Primary Intention 1996; **4**(1):9-16.
4. Young J *et al*. Risk factors associated with pressure ulcer development at a major western Australian teaching hospital from 1998 to 2000: Secondary data analysis. J Wound Ostomy Continence Nurs 2002; **29**(5):234-41.
5. Baker S & Stacey M, Epidemiology of chronic leg ulcers in Australia. ANZ J Surg 1994; **64**:258-261.
6. Rea SM & Wood F. Minor burn injuries in adults presenting to regional burns units in Western Australia: A prospective descriptional study. Burns 2005; **31**(5):1035-40.
7. Everett S & Powell T. Skin tears – the underestimated wound. Primary Intention 1994; **2**(1):28-30.
8. Prentice JL, Stacey MC & Lewin G. An Australian model for conducting pressure ulcer prevalence surveys. Primary Intention 2003; **11**(2):87-88,90-91,93-96,98-100,102-109.
9. Victorian Quality Council. VQC Statewide PUPPS Report – 2003: Pressure ulcer point prevalence survey. Melbourne, Australia: Department of Human Services, 2004.
10. Victorian Quality Council. VQC Statewide PUPPS Report – 2004: Pressure ulcer point prevalence survey. Melbourne, Australia: Department of Human Services, 2005.
11. Victorian Quality Council. Pressure ulcer basics. A guide to pressure ulcer prevention and management from the Victorian Quality Council. Melbourne, Australia: Department of Human Services. 2005 [Accessed 12 December 2005]; Available from: www.health.vic.gov.au/pressureulcers
12. Santamaria N *et al.* Clinical IT in aged care product trial. Final evaluation report for the pressure ulcer research, intervention, management and evaluation (PRIME) system in aged care trial. Canberra, ACT: Department of Health and Ageing, 2005.
13. Santamaria N *et al.* The effectiveness of digital imaging and remote expert wound consultation on healing rates in chronic lower leg ulcers in the Kimberley region of Western Australia. Primary Intention, 2004; **12**(2): 62-64,66-68,70.
14. Edwards W. Deming Institute. 2009 [cited April 2009]; Available from: http://www.deming.org