

Clinical and economic improvements in pressure injury care at Ballarat Health Services

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Objective: Ballarat Health Services (BHS) in partnership with Nursing Practice Solutions Inc. (NPS) and Smith & Nephew Pty Ltd embarked upon the implementation of a proactive Wound Care Improvement (WCI) program with the aim of achieving improved patient and economic outcomes.

Setting: The program was implemented at BHS, a regional health service in Australia, in the acute, subacute and aged residential care settings.

Design: The program utilised a methodology first introduced in Ontario, Canada, which focused on the delivery of best practice wound care across the organisation. Using an initial benchmark assessment of the organisation's outcomes, performance and educational needs, BHS implemented appropriate interventions aimed at creating and sustaining best practice wound care for all patients, decreasing pressure injury point prevalence and generating economic improvements.

Findings: A 66% decrease in organisational pressure injury point prevalence and an improvement in the use of advanced dressing products used in the prevention and treatment of pressure injuries are documented accomplishments. There was an estimated saving of over 10,000 bed days and \$4.4 million as a consequence of reducing the pressure injury point prevalence. BHS has also achieved one of the lowest international pressure injury prevalence rates. Resources including hospital staff, beds and wound care products were all used more efficiently as a result of the decrease in pressure injury point prevalence.

Conclusion: Ballarat Health Services' implementation of the WCI program has shown that a consistent, evidence-based structured

approach to pressure injury prevention and management can result in improved patient and economic outcomes.

INTRODUCTION

The care and treatment of patients with a pressure injury can be costly, resource-intensive and impact a patient's quality of life, while placing a financial burden on health care institutions¹. A pressure injury is defined as a "localised injury to the skin and/or underlying tissue usually over a bony prominence, as a result of pressure, or pressure in combination with shear"². There has been considerable effort to raise awareness of the importance of preventing pressure injuries and effectively managing injuries when they occur. The recent release of the Pan Pacific Guideline for the Prevention and Management of Pressure Injury³, along with Standard 8 from the National Safety and Quality Health Service Standards⁴, have further highlighted the need to provide evidence-based, high-quality pressure injury care to patients in the Australian health care system. Prevalence of pressure injuries in Australian acute and subacute facilities has been found to range from 11.0%⁵ to 17.6%⁶, whereas in UK hospitals it is estimated at 18–20%⁷ and in Japan, where the government has introduced an incentive system to prevent and manage pressure injuries, the prevalence rate in acute hospitals is as low as 3.64%⁸.

Pressure injuries are common complications in acute care settings⁸ and one Australian study identified median opportunity costs of \$285 million⁹. The cost of treating pressure injuries escalates with severity due to the increased healing time and high incidence of complications that can occur⁷. These complications can result in additional hospital admissions and further clinical interventions that further consume economic costs in an already stretched health care system⁷. There is also a high resource cost associated with pressure injury care, as health care professionals are required for prevention, risk assessment, regular repositioning and management of the wound, including performing dressing changes⁷. An awareness that pressure injuries result in economic losses to the Australian health care system should assist health care professionals to build the case for resources to provide clinical education and appropriate prevention strategies^{7,10}.

Pressure injuries have also become a national acute-care health priority in many countries. It has been a focus of governments in the United States and Japan to link pressure injuries to hospital reimbursement and funding^{8,11} and this trend has recently been adopted by Queensland Health, where the development of a

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hospital-acquired Stage III or IV pressure injury results in a financial penalty¹².

It has been shown that strategies which involve whole organisational commitment, incorporating clinical audits, staff education, improved wound documentation and correct product selection can decrease hospital-acquired and overall pressure injury prevalence^{1,13}. It would, therefore, be prudent that health care institutions assess ways in which clinical guidelines and best practice could be utilised in order to provide optimal care when preventing and managing pressure injuries.

Ballarat Health Services

BHS is a publicly funded, multi-campus, regional health service in Victoria, Australia that provides inpatient, outpatient and community-based services. BHS operates 782 inpatient beds across the acute (221 beds), subacute (70), mental health (67) and aged residential care (424) settings. Patient demographics include a 57% female, 42% male patient population, with a mean age of 57 years (Table 1).

In 2009 BHS was approached to participate in a WCI program. Discussion ensued with a project team from NPS which had developed and adopted a WCI program methodology in a number of Canadian health services where significant improvements had been realised. Smith & Nephew was the primary supplier of wound care products due to their complete range of advanced wound dressings which supported the philosophy and principles of the program. The company's products had been successfully used to improve patient outcomes in the aforementioned Canadian health services, and were, therefore, chosen to partner with BHS and NPS to introduce this proven¹⁴ methodology into Australia. The program was enthusiastically embraced by the nursing directorate given concerns about wound care practice inconsistencies across campuses and within individual campus units.

BHS appointed a project officer to facilitate the WCI program. Baseline data collection, a project sponsor, steering group and project metrics were determined and the same methodology adopted in Canada was implemented at BHS.

Table 1: Patient/resident demographics 2009.

Demographics	Acute n=153	Subacute n=64	Residential n=431	All BHS n=648
Age (mean years)	56	77	83	75
Gender (% female)	57	56	70	64
Diabetic (%)	19	25	21	20
Pressure risk assessment undertaken (%)	87	99	99	96
Prevention care for high pressure risk (%)	15	55	80	30
Incontinent (%)	50	11	65	20
Falls risk (%)	52	95	91	79

n=number of inpatients in 2009 audit

Aim

The aims of the BHS WCI program were to:

- audit pressure injury prevalence, prevention and treatment methods
- implement evidence-based wound care across BHS and improve patient outcomes
- improve patient quality of life by reducing the number of facility-acquired pressure injuries
- determine staff education needs and further improve their knowledge and capability in wound care
- standardise wound care practices among all health care providers
- reduce the cost of wound care services throughout the BHS community, including reductions in cost of supplies and nursing time dedicated to wound care
- improve internal business processes related to wound care product management.

This paper examines the pressure injury prevalence at BHS and the subsequent improvements in both clinical and financial outcomes related to pressure injuries as a consequence of implementing the WCI program. Other outcomes, including the full methodology of the program, will be described in further articles.

METHOD

In order to fully understand the extent of intervention required to achieve the desired aims, BHS established its performance benchmark by undertaking an extensive data collection process, involving an organisation-wide point prevalence survey and staff skills survey. The pressure injury point prevalence was determined as follows¹⁵:

Number of persons with a pressure injury

Number of persons in the population at a particular point in time x 100

Regular auditing and reporting

Initial benchmark data was collected in August 2009 when a consultant from NPS, working with BHS staff, performed an organisation-wide data point prevalence survey for wound care over a six-day period.

Each patient in inpatient care and residential care was assessed in a head-to-toe skin integrity check and clinical records were reviewed to capture information about pressure injuries that were present. A repeat point prevalence survey was completed in March 2011 and again in June 2012.

Survey data collected included the following:

- Patient demographics: age, length of stay, diabetes and insulin dependence.
- Pressure injury: risk assessment complete, Braden score, prevention care plan, prevention interventions, specialty surfaces including appropriateness and type.
- Continence: indwelling catheter, urinary incontinence, bowel incontinence, continence aids.
- Falls risk: assessment completed, history of falls, falls prevention plan.
- Intravenous therapy: peripheral intravenous therapy, central line, dressing intact, signs of infection.
- Skin condition: dermatitis, skin excoriation, denuded skin, skin tear including number of skin tears.
- Wounds: presence of wounds, wound care chart from patients clinical records, chart up to date and documentation complete, number of wounds, duration of wounds, type of wound.
- Pressure injury: stage, location, origin, documentation complete.
- Wound care: advanced dressing, dressing appropriateness, primary dressing, secondary dressing, frequency of dressing changes, time spent on dressing changes.
- Wound infection: diagnosis of infection, cultures sent, positive infective agent, clinical signs and symptoms of localised infection.

Ongoing measurement, monitoring and evaluation of survey results was overseen by a Skin Integrity Harm Minimisation Working Group and the results were communicated and reported through existing organisational governance structures.

The initial benchmark data obtained through the staff skills and knowledge survey and the organisation-wide point prevalence survey focused on:

- the level of staff knowledge in wound prevention, assessment and management
- the level of staff confidence in preventing, assessing and managing wounds
- the different types of wounds and distribution across BHS
- the prevalence of pressure injuries
- the frequency of dressings changes
- the type of dressings used
- the prevalence of wound infections
- documentation compliance
- the impact of other existing patient safety initiatives.

Using the benchmark, a suite of metrics was identified containing leading indicators of quality, process and outcome measures that best reflected optimal pressure injury care. These data were made accessible to all staff via newsletters, reports and meeting minutes to facilitate an understanding of the existing level of performance, establish ownership of the results and support strategic decision making and goal setting. Simply providing hospitals with comparative data can meaningfully impact performance; studies suggest organisations receiving comparative data can significantly outperform those receiving institutional performance data alone¹⁶.

Staff education and implementation of evidence-based care for prevention and treatment of pressure injuries

A comprehensive, learner-focused, competency-based training program was adopted and implemented in November 2009. Clinical nurse educators were recruited, trained in the program and supported by an organisational education plan that articulated resources, responsibilities and governance arrangements. The staff training combined classroom, hands-on clinical training and a train-the-trainer program. Three training modules focused on the assessment and management of chronic wounds (using the TIME principles of wound assessment and management¹⁷) and prevention, assessment and management of pressure injury were introduced as a minimum requirement for all nursing staff. Module three of the training program focused on pressure injury prevention, assessment and management. This module provided staff with training on the causes of pressure injuries, correct pressure injury staging, preventative strategies, positioning techniques and clinical guidance on managing different stages of pressure injury.

Figure 1: Summary of pressure injury reduction program components.

Planning

Leadership

Measurement and monitoring (via regular audits)

Best practice clinical protocols

Education and training

Product formulary

Reporting and communications

Engagement of patient and families

Product formulary

With the assistance of NPS, BHS devised and implemented a rationalised formulary of advanced wound care technologies and products best suited for each stage of pressure injury that would also successfully manage each component of the TIME principles. This product formulary created consistency across clinical units, was easy to understand and streamlined the ordering process for supply and procurement. If staff were providing care for a patient/resident with a pressure injury that required a product outside of the product formulary, the clinical nurse consultant wound care (CNC) would assess the wound and determine the alternative product required and ensure that the patient had access to whichever product was clinically appropriate.

Other program components

It was a priority at executive level that management and prevention of pressure injuries was a key focus of this program. Regular reporting on progress to clinical staff, management and the executive team ensured ongoing commitment and accountability from all staff members of BHS. Education of patients and families was also achieved through distribution of information leaflets and posters on pressure injuries, risk factors and preventative measures (Figure 1).

RESULTS

Staff skills and education opportunities

Education and training was a major component of the program with the skills survey of nursing, allied health and medical staff exposing a lack of knowledge relating to wound aetiology, assessment capacity and self-confidence in wound care ability. Also through surveying staff, it became evident that the majority of individuals were confused by the number of wound products available to them in their clinical units. The structured and consistent pressure injury training which staff received ensured best practice care of patients at risk of and with a pressure injury present.

Wound documentation

Implementation of the WCI project also brought about improvements in clinical documentation in areas that were previously overlooked. During the initial mapping phase, it was discovered that a large proportion of pressure injuries were not coded for funding purposes because there was insufficient clinical documentation to support coding requirements. With the introduction of an organisation-wide wound care chart as well as pressure injury prevention and

Table 2: BHS pressure injury point prevalence data.

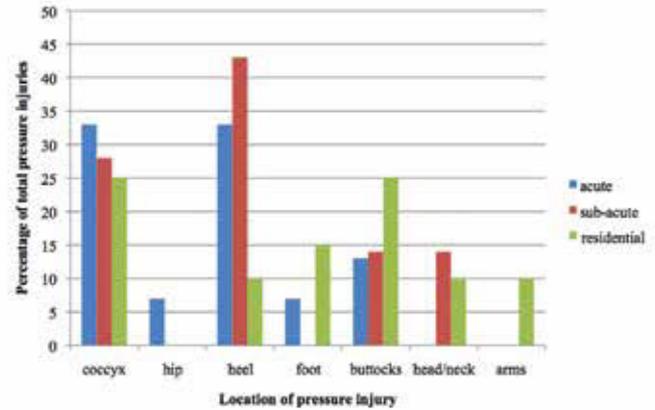
	August 2009	March 2011	June 2012
Acute (%)	11	9	2.5
Subacute (%)	26	11	8
Residential (%)	9	5	3
BHS total pressure injury prevalence (%)	11	6	3.7

management care pathways, overall wound care and pressure injury documentation improved, resulting in attracting the appropriate funding to compensate for the costs of care provided.

Pressure injury point prevalence

At the time of the initial audit in August 2009, the BHS pressure injury point prevalence was 11% in acute, 26% in subacute and 9% in residential units. From the 2009 audit to the 2012 audit there

Figure 2: Pressure injury anatomical location¹.



¹ 2011 audit results



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Table 3: Pressure injuries by stage.

	Acute			Subacute			Residential			Total		
	2009	2011	2012	2009	2011	2012	2009	2011	2012	2009	2011	2012
Stage I	16	7	1	5	1	1	21	5	1	42	13	3
Stage II	12	3	2	18	5	2	40	8	12	70	16	16
Stage III	3	2	0	2	0	0	1	5	0	6	7	0
Stage IV	1	0	0	1	1	0	0	0	0	2	1	0
Unstageable	2	3	1	0	0	3	0	2	1	2	5	5
Total	34	15	4	26	7	6	62	20	14	122	42	24

was a reduction in the pressure injury point prevalence in the acute setting from 11% to 2.9%. The point prevalence in the subacute setting decreased from 26% in 2009 to 8% in 2012. There was also a reduction in the pressure injury point prevalence in the residential unit from 9% to 3%. Over almost a three-year time frame, BHS was able to reduce the overall pressure injury point prevalence from 11% to 3.7% (Table 2).

Pressure injury by anatomical location

Results from the 2011 audit indicated that the coccyx, heel and buttocks were the anatomical locations that were most commonly affected by pressure injury (Figure 2).

Pressure injury by stage

Results of the 2009, 2011 and 2012 audits showed that Stage II pressure injuries were the most prevalent pressure injury at BHS. In 2009 there were 70 Stage II pressure injuries at BHS overall. By 2012, there were 16 Stage II pressure injuries at BHS overall. In the acute setting, there were more Stage I pressure injuries than other pressure injuries with 16 in 2009 and 7 in 2011 (Table 3).

Economic impact

Reducing pressure injury prevalence resulted in operational and economic outcomes associated with reduced length of stay along with improved documentation and coding. Analysis of patient length of stay in the organisation's acute setting for patients with and without pressure injury revealed an average additional length of stay of 3.64

bed days per patient with pressure injury. The additional bed days attributable to patients with pressure injuries was estimated by the following equation:

$$\text{Pressure injury point prevalence (\%)} \times \text{number of acute separations} \times 3.64$$

The pressure injury point prevalence over the initial three years of the program has reduced to 2.5% and, using this rate, it was estimated that there was an annual saving of 10,132 bed days in 2012 compared to 2009. It was determined that an average bed day cost in 2012 was \$437 (intensive care unit not included). This bed day cost was used to estimate the bed day savings associated with the reduced pressure injury point prevalence. In 2012, these savings were estimated to be \$4,427,684 (Table 4).

DISCUSSION

Health care institutions around the world are under immense pressure to cope with an increasing patient load, more complex patients and a health care economy that is under strain. An ageing population and increased prevalence of chronic health conditions will be associated with an increase in related wounds. The cost of wounds, particularly hospital-acquired pressure injuries, can impact on hospital length of stay, cost of labour and also on patient quality of life and wellbeing. It is imperative that hospitals provide evidence-based wound care in order to improve healing time, decrease the risk of complications and reduce the prevalence of hospital-acquired pressure injuries.

Table 4: BHS estimated organisational impact associated with pressure injury prevalence.

	Number of acute separations	Pressure injury point prevalence	Number of patients with pressure injury	Estimated additional bed days	Estimated bed day savings compared to 2009	Estimated bed day savings (\$) ⁱ .
2009	33,607	11%	3,697	13,456	-	-
2011	34,909	9%	3,142	11,436	2,020	\$882,740
2012	36,531	2.5%	913	3,324	10,132	\$4,427,684

ⁱ Based on average cost acute inpatient \$437/day

Over the past few years there has been a focus of governments in Japan and the United States to link hospital funding to pressure injuries. In Japan, the government offers an incentive system to reduce the number of hospital-acquired pressure injuries⁸, whereas in the United States, a penalty system is in place¹³. There has been a move recently in Australia to heighten the importance of hospital-acquired pressure injuries by using prevalence rates as an indicator of the quality of care provided. Hospitals in Australia are now required to adopt processes for pressure injury prevention, management and regular reporting as part of Standard 8 of the Australian National Safety and Quality Health Service Standards⁴.

BHS implemented a WCI program, incorporating staff education and protocol change, which has successfully decreased the point prevalence of pressure injuries and improved hospital efficiency. An initial baseline audit provided an indication of key areas for improvement and allowed the program to be tailored to ensure that clinical and economic outcomes were optimised. In the past three audits, the number of pressure injuries in the acute, subacute and residential units has decreased dramatically and the overall pressure injury point prevalence at BHS has reduced by 66% (from 11% to 3.7%). BHS has achieved one of the lowest international pressure injury prevalence rates and this decrease has meant that beds at BHS are not being unnecessarily utilised by patients with

pressure injuries and nursing time can be redirected to other patient care activities.

The estimated bed day savings associated with the reduced pressure injury point prevalence was over \$4.4 million per annum. These financial savings come at a time when health care services and hospital budgets are under pressure and have allowed BHS to allocate funding more efficiently to ensure optimal clinical outcomes are achieved.

It has been shown that a comprehensive, evidence-based wound care program such as this, incorporating; staff education, engagement from multiple stakeholders including hospital executives, nursing staff, patients and families along with the development of a product formulary, regular auditing, communication and monitoring, ensures that nursing time and precious health care resources are used efficiently.

LIMITATIONS

The WCI program has seen improvement in pressure injury point prevalence at BHS; however, a full statistical analysis has not been conducted, which would reveal whether these improvements were statistically significant. These results are limited by the fact that this is an example of an intervention rather than a structured randomised controlled trial. For the purpose of calculating the financial impact of



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reduced pressure injury point prevalence, we have assumed that the point prevalence rates are indicative of the overall annual prevalence rate of pressure injuries at BHS. The audits conducted have not been at a consistent time point each year; therefore, comparisons between audits are not for the same time period. This may have affected the point prevalence rates and must be a consideration when drawing comparisons between audit results.

CONCLUSION

Through the WCI program, BHS has achieved one of the lowest international pressure injury prevalence rates and has created an environment of leadership and patient safety. In addition, all staff involved in this program are providing excellence in patient care and creating an environment for learning, safety and leadership. The senior management team have proven that through leadership and commitment, quality patient care across such a large, diversified organisation is achievable.

The obvious success of the project in achieving the original objectives has been acknowledged and the wound care improvement methodology continues to be applied as an ongoing service-wide program at BHS. The role of personnel development in wound care programs and services had become crucial. The BHS experience in wound care in hospital and residential situations has demonstrated that the successful diffusion of new ideas and technologies ultimately depends on the skills, capabilities and motivations of *people*. In medicine and particularly in wound care, we are counting on *people* to make a difference – to change their practices and become more effective in how they manage wounds¹⁸. BHS was able to reduce its pressure injury point prevalence through the implementation of a consistent methodology, designed to simplify and streamline wound care practices and processes, in a relatively short period of time and is continuing to improve upon its performance three years post implementation. The decision to implement this program resulted in improved patient and economic outcomes.

CONFLICTS OF INTEREST

TA is an employee of Nursing Practice Solutions Inc.

KC is an employee of Smith & Nephew.

Smith & Nephew provided third party payment of program licensing rights and consulting services by Nursing Practice Solutions.

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Ms Theresa Hurd, the Director of Nursing Practice Solutions, owns the intellectual rights to the WCI program and managed the data collection and analysis of the BHS audits.

REFERENCES

1. Carson D, Emmons K, Falone W & Preston AM. Development of pressure ulcer program across a university health system. *J Nurs Care Qual* 2011; 27(1):20–27.
2. National Pressure Ulcer Advisory Panel. NPUAP Pressure Ulcer Stages/ Categories. <http://www.npuap.org/resources/educational-and-clinical-resources/npuap-pressure-ulcer-stagescategories/> Accessed 4 December 2012.
3. Australian Wound Management Association. Pan Pacific Clinical Practice Guideline for the Prevention and Management of Pressure Injury. Osborne Park: Cambridge Media; 2012.
4. Australian Commission on Safety and Quality in Health Care (ACSQHC) National Safety and Quality Health Service Standards. Sydney: ACSQHC; 2011.
5. Mulligan S, Prentice J & Scott L. WoundsWest Wound Prevalence Survey 2011 State-wide Overview Report. Ambulatory Care Services, Perth, Western Australia: Department of Health; 2011.
6. Clinical Epidemiology and Health Services Evaluation Unit, Melbourne Health. PUPPS 3 – The Pressure Ulcer Point Prevalence Survey Statewide Report 2006. Melbourne: Department of Human Services; 2006.
7. Dealey C, Posnett J & Walker A. The cost of pressure ulcers in the United Kingdom. *J Wound Care* 2012; 21(6):261–266.
8. Sanada H, Nakagami G, Mizokami Y *et al*. Evaluating the effect of the new incentive system for high-risk pressure ulcer patients on wound healing and cost-effectiveness: A cohort study. *Int J Nursing Studies* 2010; 47:279–286.
9. Graves N, Birrell F & Whitby M. Modeling the economic losses from pressure ulcers among hospitalized patients in Australia. *Wound Rep Reg* 2005; 13:462–467.
10. Gethin G, Jordan-O'Brien J & Moore Z. Estimating the costs of pressure area management based on a survey of ulcer care in one Irish hospital. *J Wound Care* 2005; 14(4):162–165.
11. Bales I & Duvendack T. Reaching for the moon: achieving zero pressure ulcer prevalence, an update. *J Wound Care* 2011; 20(8):374–377.
12. Queensland Health. West Moreton Hospital and Health Service 2012–13 Service Agreement. http://www.google.com.au/url?sa=t&rct=j&q=&esrc=s&frm=1&source=web&cd=1&ved=0CDQJFjAA&url=http%3A%2F%2Fwww.health.qld.gov.au%2Fhhsserviceagreement%2Fdocs%2Fservice_agreement%2Fwmtsa_v2.pdf&ei=EdbHUPK4ApOY9QTgzoHIAQ&usq=AFQjCNF6LNOSIGVvYILc8DKFCzGYVoVncw&sig2=A_beAhegw9y-SNLKoprE4A. Accessed on 12 December 2012.
13. Bales I & Padwojski A. Reaching for the moon: achieving zero pressure ulcer prevalence. *J Wound Care* 2009; 18(4):137–144.
14. Hurd T, Zuilian N & Posnett J. Evaluation of the impact of restructuring wound management practices in a community care provider in Niagara, Canada. *Int Wound J* 5(2):295–303.
15. Calianno C. Quality improvement strategies to prevent pressure ulcers. *The Nurse Practitioner* 2007; 32(7):10–15
16. Nursing Executive Center, The Data-Driven Nursing Enterprise: Leveraging Data to Advance Hospital Nursing Performance, The Advisory Board Company, Washington, DC, 2007.
17. Schultz G, Sibbald G, Falanga V *et al*. Wound bed preparation: a systematic approach to wound management. *Wound Rep Reg* 2003; 11:1–28.
18. Hurd T. Education Plan. Ballarat Health Services 2010–2011.