

Estimated reduction in expenditure on hospital-acquired pressure injuries after an intervention for early identification and treatment

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ABSTRACT

AIM: An intervention designed to reduce numbers of hospital-acquired pressure injuries was delivered in Counties Manukau Health hospitals. An audit of a sample of patients was carried out to estimate the cost savings that would have been acquired across the district health board (DHB) due to a reduction in pressure injuries.

METHOD: The pressure injury intervention was delivered from 2011 to 2015. A monthly prospective audit of patients with stages 1, 2, 3 and 4 pressure injuries was carried out. This involved a random sample of five patients per ward in all hospitals in Counties Manukau DHB.

RESULTS: It was found that the annual estimated cost of treating pressure injuries in hospital patients was NZ\$12,290,484 less in 2015 than in 2011.

CONCLUSION: Implementation of strategies for managing hospital-acquired pressure injuries can lead to potentially large financial savings for hospitals, as well as reducing the burden of managing this difficult condition for patients and staff.

Localised injuries to the skin and/or underlying tissue that usually develop over bony parts of the body due to sustained pressure, or pressure combined with shear are known as pressure injuries.¹ These can develop in hospitals where patients have health conditions that make it difficult to move, especially where patients are confined to a bed, sitting for long periods of time or undergoing lengthy surgical procedures. Pressure injuries are categorised into stage 1: non-blanchable erythema of intact skin, stage 2: partial thickness skin loss, stage 3: full thickness skin loss, and stage 4: full thickness tissue loss with exposed bone, tendon, muscle or cartilage, as well as 'unstageable: depth unknown' and 'suspected deep tissue injury: depth unknown' classifications.² Further explanation of the National

Pressure Ulcer Advisory Panel and European Pressure Ulcer Advisory Panel (NPUAP/EPUAP) pressure injury classifications can be found in the 2014 NPUAP/EPUAP and Pan Pacific Pressure Injury Alliance (PPPIA) Quick Reference Guide.²

Patients at increased risk of developing pressure injuries include those with mobility limitations, poor nutrition, health conditions that disrupt the blood supply or make the skin more vulnerable to injury and damage, aging skin, urinary or bowel incontinence and those who have serious mental health conditions (NHS, 2014).³ Approximately 55,000 people a year in New Zealand experience a pressure injury, and these can cause constant pain, loss of function and mobility, increased financial burdens, prolonged hospital stays, septicaemia and even death,

as well as depression, distress and anxiety, embarrassment and social isolation.⁴ The Northern Regional Alliance 'First, Do No Harm' point prevalence survey in 2014 found an overall prevalence rate of 4.7% pressure injuries in their DHB hospitals, while the Central Region DHBs 2014 study showed a prevalence range of 8.3%.⁴

According to Bennet, Dealey and Posnett (2004),⁵ the mean cost of treating a hospital or long-term care setting pressure injury in the UK in 2004 was £1,064 (NZ\$1,856.56) for stage 1 pressure injuries, £4,402 (NZ\$7,681.00) for stage 2, £7,313 (NZ\$12,760.37) for stage 3 and £10,551 (NZ\$18,410.33) for stage 4 (currency converted on 22/02/2017). Adjusting for inflation, the cost at the end of 2016 of treating a stage 1 pressure injury would be NZ\$2,395.36, for stage 2 would be NZ\$9,910.13, for stage 3 would be NZ\$16,463.12 and for stage 4 would be NZ\$23,753.24 (Reserve Bank of New Zealand, 22/02/2017).⁶ These costs include nurse time, dressings, antibiotics, diagnostic tests, support surfaces and inpatient days (the authors state that "The cost of support surfaces assumes equipment is purchased rather than rented (which is generally more expensive)") (p.230).

A prospective audit of hospital-acquired pressure injuries was carried out at Counties Manukau Health hospitals from 2011–2015, during an intervention to reduce the incidence of these. The results of this audit were used to estimate cost savings that might have been acquired across all five Counties Manukau Health hospitals in the intervention period.

Method

Annual pressure injury audits started in 2009 with all in-patients at Middlemore Hospital, Manukau Surgery Centre, Auckland Spinal Rehabilitation Unit, Pukekohe and Franklin hospitals being assessed for pressure injuries using a standardised single-sheet assessment on a given day. Due to the high prevalence rate, a pressure injury working group was established to implement new initiatives and identify areas for improvement. From February 2011, regular monthly prospective audits of a sample of five randomly chosen patients per ward commenced in

all Counties Manukau Health hospitals to ensure a consistent approach to identifying prevalence trends. In these audits, the number of patients with stage 1, 2, 3, and 4 and unstageable pressure injuries were recorded with the highest stage of injury recorded for each patient. The number of patients with pressure injuries were recorded rather than the number of pressure injuries that occurred, as it was expected that treating a single patient with multiple pressure injuries would not cost as much as treating the same number of pressure injuries across multiple patients, as in the former case only one bed is needed to treat multiple injuries simultaneously. Risk assessments were standardised across the organisation with the expectation the assessment is completed within six hours of admission, and associated bundles of care implemented based on the assessment score, and clinical judgement.

Nurse wound care champions were identified in each ward/unit who participated in the monthly audits and completed a full pressure injury risk assessment, including a full visual skin check, documentation review and recording of any pressure relieving equipment in use. The nurse champions also provided support and education to the ward nursing teams and feedback on the outcomes of the audits to identify areas for improvement. Education packages, including ward resource folders, a pressure injury website, e-learning packages and patient information leaflets were developed. These were aimed primarily at nursing staff and promoted by pressure injury champions.

A review of pressure injury rental equipment and a staff survey was carried out with nursing and allied health staff. A survey was sent out at the start of June 2012 and 73 responses were received. The information collected was intended to identify themes to help the pressure injury working group understand requirements relating to pressure injuries. This showed there were several suppliers of pressure-relieving equipment, in addition to Counties Manukau Health-owned equipment. It also pointed to the need for clarity and transparency on equipment use, ordering systems and costs. In response, a streamlined pressure-relieving equipment decision tree was implemented in 2014 that aligned risk assessment findings with equipment orders.

Table 1: Number of patients with pressure injuries found in monthly audit.

Year	Total patients in audit sample	Patients with pressure injuries					
		Stage 1	Stage 2	Stage 3	Stage 4	Unstageable	Stage 3, 4 and unstageable collapsed
2011	2,078	101 (4.86%)	31 (1.49%)	8 (0.38%)	4 (0.19%)	4 (0.19%)	16 (0.76%)
2012	2,065	69 (3.34%)	22 (1.07%)	3 (0.15%)	4 (0.19%)	5 (0.24%)	12 (0.58%)
2013	2,375	74 (3.12%)	23 (0.97%)	3 (0.13%)	0 (0%)	2 (0.08%)	5 (0.21%)
2014	2,057	50 (2.43%)	28 (1.36%)	2 (0.1%)	4 (0.19%)	6 (0.29%)	12 (0.58%)
2015	2,353	32 (1.36%)	29 (1.23%)	3 (0.13%)	0 (0%)	4 (0.17%)	7 (0.30%)

Results

Table 1 shows the numbers of patients with pressure injuries found in the sample participating in monthly audits, across the intervention implementation period. As there were few patients with stages 3, 4 and unstageable pressure injuries, it was decided to collapse these categories before using the figures to extrapolate numbers of pressure injuries across hospitals (Table 2). For example, in 2013 there were no stage 4 pressure injuries as compared to four in 2012. Although this was only a small difference in the absolute number of stage 4 pressure injuries, when the percentage was multiplied by the tens of thousands patients admitted to Counties Manukau Health

hospitals annually (see Table 2), this small change in percentage would have a dramatic, and possibly disproportionate, effect on the overall estimate of the number of stage 4 pressure injuries across the hospitals.

Table 2 shows the cost of pressure injuries across Counties Manukau Health hospitals from 2011 to 2015, based on estimates of the percentage of patients with pressure injuries from the monthly audit shown in Table 1. Stages 3, 4 and unstageable pressure injuries were costed as stage 3 pressure injuries, based on clinical advice in the case of unstageable injuries, and also to be conservative when making estimates on savings made due to pressure injury reduction from 2011–2015.

Table 2: Estimated cost of pressure injuries 2011–2015.

		Estimated numbers of patients with pressure injuries			Estimated cost of pressure injuries across hospitals (NZ\$)			
Year	Total patients admitted to Counties Manukau hospitals (without babies)	Stage 1	Stage 2	Stage 3, 4 and unstageable	Stage 1	Stage 2	Stage 3, 4 and unstageable	Total cost across Counties Manukau Hospitals
2011	67,701	3,291	1,010	521	7,883,130	10,009,231	8,577,286	26,469,647
2012	68,278	2,281	727	397	5,463,816	7,204,665	6,535,859	19,204,339
2013	68,761	2,142	666	145	5,130,861	6,600,147	2,387,152	14,118,160
2014	70,575	1,715	961	412	4,108,042	9,523,635	6,782,805	20,414,483
2015	69,601	947	858	207	2,268,406	8,502,892	3,407,866	14,179,163
TOTAL	344,916	10,376	4,222	1,682	24,854,255	41,840,569	27,690,968	94,385,792

Table 2 shows that the estimated total cost of pressure injuries generally decreased between 2011 and 2015. However, there was an increase in the total cost of pressure injuries in 2014 as compared with 2012, 2013 and 2015, which is due to an increase in stages 2 and 3, 4 and unstageable pressure injuries in this year. Nevertheless, the estimated cost of pressure injuries in hospital patients was \$12,290,484 less in 2015 than in 2011.

Discussion

Findings from our audit show reductions in the incidence of pressure injuries have been made at Counties Manukau Health hospitals by implementation of interventions to manage this issue. We have attempted to estimate the potential financial savings that may have been made by extrapolating findings from an audit that sampled one in six patients in hospital wards, and have noted considerable potential savings over the course of the intervention.

Our findings are congruent with those found in the literature. For example, Sullivan and Schoelles (2013)⁷ reviewed studies of initiatives to prevent pressure injuries in acute and long-term care settings in the US. Findings from 26 studies, where data was collected at least six months after initiatives had been implemented, suggested that reduced pressure injury rates could be achieved through: “simplification and standardisation of pressure ulcer-specific interventions and documentation, involvement of multidisciplinary teams and leadership, use of designated skin champions, ongoing staff education and sustained audit and feedback” (p.410).

In addition, Spetz, Brown, Aydin and Donaldson (2013)⁸ also assessed cost savings related to using nurses in preventing

hospital-acquired pressure injuries. They described approaches to prevention, including the “use of specially designed support surfaces, frequent repositioning of patients, attention to patient nutrition, and management of moisture and incontinence” (p.236), as well as “risk screening upon admission, systematic assessment and reassessment of individual risk factors along with skin inspections, implementation of a skin care regimen and repositioning of patients” (p.236). They found improvements in pressure injury rates across 78 hospitals that contributed data to the Collaborative Alliance for Nursing Outcomes from 2003 to 2010 (258,456 patients), and suggested a Return on Investment rate of 1.61, with net savings of \$127.51 per patient (savings were estimated from published literature).

We accept that the assessment of savings made due to reduction in pressure injuries is very approximate, especially as the estimate of the cost of treating pressure injuries is taken from background literature rather than using recorded costs, which were not available in sufficient detail to be used. A proper cost analysis would rely on recording costs fully, including equipment, staff time and other resources used for managing pressure injuries. However, we are confident that our study does at least indicate that savings can be made by implementation of interventions such as ours to manage pressure injuries in hospitals. Furthermore, we were conservative in our estimate of the costs of stage 4 and unstageable pressure injuries, which lends weight to this assertion. In conclusion, we suggest that implementing strategies to manage hospital-acquired pressure injuries can lead to potentially large financial savings for hospitals, as well as reduce the burden of managing this difficult condition for patients and staff.

Competing interests:

Nil.

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REFERENCES:

1. Health Quality and Safety Commission New Zealand. Pressure Injury Prevention. Available at: <http://www.hqsc.govt.nz/our-programmes/other-topics/new-projects/pressure-injury-prevention/>. Accessed March 7, 2016.
2. NPUAP/EUPAP/PPPIA. Prevention and Treatment of Pressure Ulcers: Quick Reference Guide. Available at: <http://www.npuap.org/wp-content/uploads/2014/08/Quick-Reference-Guide-DIGITAL-NPUAP-EUPAP-PPPIA.pdf>. Accessed March 7, 2016.
3. NHS. Pressure Ulcers – Causes. Available at: <http://www.nhs.uk/Conditions/Pressure-ulcers/Pages/Causes.aspx>. Accessed March 7, 2016.
4. KPMG. The case for investment in: A quality improvement programme to reduce pressure injuries in New Zealand. Available at: <https://www.hqsc.govt.nz/assets/Pressure-Injuries/PR/KPMG-pressure-injury-report-Jan-2016.pdf>. Accessed March 7, 2016.
5. Bennett G, Dealey C, Posnett J. The Cost of Pressure Ulcers in the UK. Age and Ageing. 2004; 33(3):230–235.
6. Reserve Bank of New Zealand. Inflation Calculator. Available at: <http://www.rbnz.govt.nz/monetary-policy/inflation-calculator>. Accessed February 22, 2016.
7. Sullivan N, Schoelles K. Preventing In-Facility Pressure Ulcers as a Patient Safety Strategy. Annals of Internal Medicine. 2013; 158(5):410–416.
8. Spetz J, Brown DS, Aydin C, Donaldson N. The Value of Reducing Hospital acquired Pressure Ulcer Prevalence: An illustrative analysis. Journal of Nursing Administration. 2013; 43(4):235–241.