Pressure injury prevalence in a private health service: risks and recommendations

Gardner A, Millar L, Legg S, Gomez Y, McGillion T, McGillion T & Mulcahy A

Summary

A pressure injury point prevalence was conducted by a private healthcare service (PHS) to determine the prevalence of pressure injuries in inpatients and to provide statistics for use in future comparison studies. The survey was conducted as part of the quality improvement programme of the PHS and the survey instrument was a modified version of a widely used existing tool. On the day of the survey, data collectors, working in pairs, performed skin inspections and completed the survey. Data were then collated and analysed. The overall pressure injury prevalence was 28.2% but with the exclusion of stage one injuries, decreased to 9.9%. Multivariate analysis revealed that the main risk factors for pressure injury development were the inability to reposition independently, older age and having a diagnosis of cancer. The major recommendations for practice change included the provision of pressure relieving devices to all patients unable to reposition independently, alteration of the Braden Scale risk score used on admission to identify older patients at risk from 16 to 18 in accordance with published literature and provision of further education to nurses about use of the Braden Scale and of pressure relieving devices. This study has also highlighted the need for further investigation into the reasons for patient non-participation in research and the direct and indirect relationships between surgery and acquisition of pressure injuries.

Introduction

Pressure injuries are common in healthcare settings [1]. They are detrimental to both health outcomes of patients and the economic condition of the healthcare provider [2]. Pressure injuries can result in increased pain for the patient [3, 4] and decreased quality of life [4]. Furthermore, patients with pressure injuries have a 50% longer length of stay than patients without pressure injuries and, in 2004, accounted for 44,406 bed days per annum leading to an estimated risk-adjusted cost of approximately A$19 million [5]. Indeed Jacquot, Pelissier, Finels and Strubel [6] confirm that economic costs to healthcare services can be reduced by the prevention and prompt treatment of pressure injuries. In addition to these direct economic costs, pressure injuries are likely to feature in litigation cases, thus resulting, indirectly, in further costs [7]. Hence pressure injury incidence and prevalence needs to be monitored and relevant interventions applied to ensure optimal outcomes for both the patient and the health service.

The first step towards elimination or control of pressure injuries is correctly identifying the presence and stage of the injury. The Australian Wound Management Association (AWMA) defines pressure injury as any lesion caused by unrelieved pressure resulting in the damage of the skin and underlying tissue [8]. Pressure injuries range in severity from stage one, least severe, to stage four, most severe [8]. It is easier to treat less severe pressure injuries, making early detection crucial.

Prevalence studies are common in the healthcare field and, due to the methodology involved, can uncover disorders that might otherwise go undetected. Pressure injury prevalence has been measured in public healthcare services both internationally and nationally with many of the reported international studies emanating from Europe and America. For example, Gunningberg [9] found the prevalence of pressure injuries affecting inpatients (n = 460) in an acute care setting in Sweden was 18.5%. These were mainly stage one injuries (68.5%), with equal proportions of stages two and three injuries (12.3% each) and the remainder stage four pressure injuries (6.9%). Whittington and Briones [10] summarised a series of pressure ulcer prevalence studies spanning 6 years in United States Healthcare Organisations (HCOs). One hundred and fifteen HCOs participated in 1999 increasing to 240 HCOs in 2004. Baseline prevalence in 1999 was 17% and this had dropped only 1% to 16% by 2004. Similarly, Runy [11] reported an overall baseline pressure injury prevalence of 14.8% from a large sample of US hospitals in 1999 and this prevalence increased to 15.2% by 2005. Clearly there had not been successful interventions, aimed at decreasing prevalence, incorporated into the patient care practices of these hospitals. This statement is supported by the increase

in other facility-acquired pressure injury prevalence from 1999 (7.1%) to 2005 (7.3%) [11]. Other baseline pressure injury prevalence studies conducted in hospitals internationally reported overall prevalence from 13.1% in Germany through 23.3% in the Netherlands to 32.1% in England, when all stages of injuries were included; however, when stage one injuries were excluded, the prevalence dropped to 6.1%, 11.8% and 19.7%, respectively [12-14]. In summary, there is much discrepancy between the reported prevalence of pressure injuries throughout the world.

The international baseline figures above are much higher than the 6% prevalence reported in a study of 18 rural New South Wales' (NSW) hospitals [15], but the difference may lie in the methodology employed and patient demographics. The NSW study required patients with pressure injuries to be identified by the ward nurse and only these patients were included, whereas the other studies cited above inspected all patients who agreed to a skin examination. The latter method may provide greater accuracy in identifying pressure injury prevalence: not all pressure injuries are documented in clinical notes and may go unnoticed or unreported by the ward nurse. Also the admission diagnoses of the NSW sample appeared to include few, if any surgical or palliative patients and both these patient categories have been related to pressure injury development [15, 16]. Australian pressure injury prevalence ranges from a reported 6% to 32.1% in acute care hospital settings when all stages are included and 6.1% to 19.7% when stage one injuries are excluded [15, 16]. Until there is a standardised methodology that is consistently applied across studies it may not be useful to compare between studies.

The use of the Pressure Ulcer Point Prevalence Survey tool by several Australian studies goes some way towards redressing this problem [17]. For example, the Victorian Statewide Pressure Ulcer Point Prevalence Surveys first conducted in 2003 (VicPUPPS1) and repeated in 2004 (VicPUPPS2) used this tool with similar public healthcare providers and thus, are directly comparable. Use of this tool with different samples (for example private healthcare providers) would provide useful comparisons.

All of the abovementioned pressure injury prevalence studies have been conducted in public healthcare settings and, although private hospitals actively participate in audit and research, none have reported pressure injury prevalence either in Australia and overseas [18-22]. The two published Victorian statewide PUPPS report data from Victorian public acute and sub-acute health services but not from any private settings.

Pressure injuries can affect anyone but are more prevalent in older people, due to factors such as decreased mobility, incontinence, skin fragility, under–nutrition [6, 23-26] and in those people who undergo surgery [27]. These factors can be categorised as external and internal: external factors included pressure, moisture, shear and friction and, in contrast, internal factors include nutrition, mobility and vascular condition [8, 26]. In addition, Thoroddsen [26] *et al* [28] found that, independent of type of health setting, age was a dominant factor in the existence of pressure injuries.

Furthermore, Maklebust [24] cites debilitating chronic illness as an important factor in relation to the development of pressure injuries; while other studies cite surgery as strongly related to their development [9, 27]. In summary, patients most at risk are

Professor Anne Gardner * RN PhD
Professor of Nursing – Tropical Health
James Cook University, Townsville, QLD (formerly Cabrini-Deakin Centre for Nursing Research, Cabrini Health)
James Cook University,
Townsville, QLD 4811
Phone 07 4796 2552
Fax 07 4796 2561
Email anne.gardner@jcu.edu.au

Ms Lynne Millar BA (Psych Hons)
Research Officer, James Cook University, Townsville, QLD (formerly Cabrini-Deakin Centre for Nursing Research, Cabrini Health).

Adjunct Professor Sandra Legg RN, MSc
Director of Nursing, Cabrini Health, VIC

Ms Yvette Gomez RN, BN
Cabrini Health, VIC

Mr Tony McGillion RN, B. Ed
Manager, Cabrini Health, VIC

Mr Aidan Mulcahy RN, B.Philosophy
Cabrini Health, VIC

*Corresponding author

The study was completed across three campuses of Cabrini Health;
- 183 Wattletree Rd, Malvern VIC 3144,
- 243 New Street, Brighton, VIC 3186
- 646 High Street, Prahran, VIC 3181

also those people most dependant on others for assistance with everyday tasks. Acquiring a pressure injury compounds their existing morbidities and impacts negatively on their lives emotionally, psychologically and socially [4].

It is important that patients most at risk of developing a pressure injury are identified in order to facilitate early intervention, thus leading to minimisation or prevention of pressure injuries. A widely acknowledged best practice strategy in the prevention of pressure injuries is risk assessment. Clinical risk assessment tools are used to ascertain the level of risk in individual patients for developing a pressure injury. The Braden Scale [29] is an example of one such tool. The Braden Scale is a reliable and valid predictive tool that is commonly used in comparative studies [30-32].

To recapitulate, pressure injuries are costly to both patient health and the economic wellbeing of the healthcare organisation. In order to minimise these costs, it is essential that those patients who are most at risk of developing pressure injuries or already have pressure injuries are accurately identified. Interventions can then be put in place to prevent the formation or continuation of pressure injuries. Accurate risk assessment depends on the reliability of the tool used and the skill level of the nurse. The reliability of the Braden Scale has been validated in numerous studies and nurses are able to further develop skills through education and experience. Therefore a pressure injury prevalence study serves a threefold purpose. The first is that it identifies those patients who have pressure injuries or are at risk of developing them. The second is that the survey elicits areas of specific concern in relation to treatment of pressure injuries The third is that it presents an opportunity for nursing staff to further develop their skills in risk assessment and pressure injury diagnosis. On recognition of these areas, interventions can be formulated and implemented to rectify this deficiency.

A pressure injury point prevalence study was initiated by the private healthcare provider as part of a comprehensive pressure injury identification and prevention strategy. It was anticipated that the study would identify those patients with pressure injuries as well as those who were most at risk of developing them. Findings from the study could then be used as baseline figures for future comparisons within the service and for benchmarking against other comparable healthcare providers. The results of the first pressure injury point prevalence in the private healthcare setting are presented here.

The aims of the first Pressure Ulcer Point Prevalence Study conducted by the private healthcare service (PHS) were:

1. To determine the prevalence of pressure injuries in inpatients.
2. To establish baseline indicators for use in future comparison studies.

Comparisons could then be drawn between these findings and results from the Victorian Public Health Services Statewide PUPPS 2003 (VicPUPPS1) and 2004 (VicPUPPS2).

Method

Design

A point prevalence study design was used. Prevalence measures the proportion of a population that has a specific existing condition at a given point in time. Point prevalence refers to the existence of a condition at a specific point in time. Prevalence includes all patients with a particular condition regardless of whether it developed during or prior to an episode of care.

Population and sample

The surveyed PHS operates as a not-for-profit organisation and includes a 24-hour emergency department, cardiac surgery, paediatrics and a large oncology service as well as general medical and surgical care. It comprises four campuses: three acute care facilities and one residential aged care facility. This point prevalence focused on the acute facilities. Limited information was collected on all inpatients of the acute care facilities on the day of the point prevalence. Consenting inpatients deemed sufficiently physiologically stable to undergo a skin inspection by trained surveyors were included in the calculation of pressure injury prevalence.

Materials

The two tools used in this project were the inter-rater reliability test tool developed by Prentice, Stacey and Lewin [17] and the Pressure Ulcer Point Prevalence Survey Tool. The Pressure Ulcer Point Prevalence Survey Tool comprised twenty-seven items. The first fifteen items sought information on patient demographics including age, gender, primary medical specialty and consent for skin inspection. Items sixteen to twenty-five were only completed for patients who agreed to the skin inspection. Responses to these items were collected during direct observation and interaction with the patient. Items in this section included skin colour, ability to independently reposition and number and location of any pressure injuries. The final two items were sourced from the clinical record and related to presence of pressure injuries on admission and management of pressure injuries.

Training

All data collectors attended an education session that encompassed both the material covered in the training for the Victorian PUPPS1 and PUPPS2 and training in pressure injury risk assessment.

Procedure

The surveys were conducted as part of the quality improvement programme. On the morning of the survey, the nurse managers, or their delegate, circulated printed material outlining the project to all eligible inpatients. Later that day, data collectors, working in pairs, collected limited information on all inpatients and then approached inpatients, informed them of the requirements of the survey and invited them to participate. After verbal consent was obtained, the data collectors then proceeded with the skin inspection and completion of the survey. One data collector acted as a scribe and the other as an examiner.

Data management

Results were analysed using SPSS for Windows V.12 (Statistical Package for the Social Sciences). Specifically, prevalence was calculated by dividing the number of cases of pressure injuries by the total number of patients who agreed to a skin inspection then multiplying the resulting figure by 100, thereby obtaining a percentage. Differences between groups were tested for significance using Chi Square analyses and unadjusted odds ratios. Strengths of associations were tested using the Pearson Correlation Coefficient. Multivariate logistic regression analysis was performed to analyse the association between known risk factors for pressure injuries and those risk factors with significant unadjusted odds ratio in preliminary analysis (using $p <= 0.1$ [33]) and observed pressure injuries on inpatients using the presence of a pressure injury as the dependant variable.

Ethical considerations

The prevalence survey was approved by the healthcare service's Human Research Ethics Committee as being conducted under the auspices of quality assurance [34]. All participants were fully informed of the survey requirements before verbal consent to participate was requested. Those inpatients, identified by the nurse managers or their delegate as being unfit, were not approached.

Confidentiality

All identifying material was held separately and securely from other data. Records were held separately in locked storage and were retained for a period of seven years. Access to electronic data was protected by a password known only to the research team. For reports and publication, data were aggregated or otherwise de-identified to provide anonymity.

Results

The Pressure Ulcer Point Prevalence was conducted on 8 June 2006. The surveys were completed by fifteen pairs of nurse data collectors and no nurses surveyed in their allocated wards.

Demographics and participation rate

The sample comprised 383 inpatients across three campuses. The newborns were reported separately in order that results remain comparable to earlier studies, leaving 370 adults and children (males, $n = 146$; females, $n = 224$) with median age of 73 years, minimum age 2 years and maximum age 97 years.

The percentage of patients who did not participate in a skin examination was approximately 30% ($n = 110$) except at the acute palliative care service where it was 50% ($n = 10$). Of the patients who did not participate in the skin examination, three alternatives reasons were offered with space for further explanation: 38.2% declined to give their consent, 29.1% were too ill and 32.7% indicated 'other' on the response sheet.

Prevalence

The combined prevalence across the three campuses was calculated using the number of patients with pressure injuries, 71, divided by the total number of patients surveyed who agreed to a skin inspection, 252 then multiplied by 100. The resulting prevalence was 28.2%, excluding newborns but including their mothers Prevalence excluding stage one pressure injuries was 9.9%. The sub-sample of newborns recorded no pressure injuries.

The prevalence of pressure injuries per medical specialty (not by ward) was as follows. Patients in the oncology specialty recorded the highest prevalence (50.0%), followed by palliative care and general surgical (both 40.0%). Plastic surgery, gastroenterology, respiratory medicine and urology all recorded prevalence above the average of 28.2%. The medical specialties of orthopaedic, general medicine, geriatric medicine and cardiovascular or cardiology all recorded prevalence lower than the average. Prevalence of all other specialties was combined due to low numbers and the resulting prevalence was 23.5%.

Documentation relating to pressure injuries within previous 5 days

Of the 71 patients with pressure injuries, 15 had documentation relating to the progress or management of pressure injuries within the 5 days prior to the survey, 46 had no documentation. For the remaining 10 patients this information had been

missed on the day of the study. Thus, one quarter of patients had documentation related to their pressure injury in the preceding 5 days.

Distribution and severity of pressure injuries

The survey identified 71 people with pressure injuries. Of these, approximately half (n = 36) had one injury. Patients with two, three and four pressure injuries accounted for most of the remaining sample (n = 26) while a small number of patients had five or more pressure injuries (n = 9). The patients displayed a higher percentage of stage one pressure injuries (79.7%) compared to stage two (14.8%), with stages three and four pressure injuries making up the remaining 5.5%. For the purposes of this analysis and following analyses, all unclassified pressure injuries in this project were included as stage four pressure injuries

As indicated in Table 1, the most common bodily locations affected by pressure injuries were the heel (24.2%), followed by toes (18.1%) and sacrum (16.5%). The elbow, buttocks, foot and leg each accounted for less than 10% of pressure injuries. Body parts most affected all featured bony protrusions.

Pressure injury prevalence by demographic and clinical factors

The prevalence of pressure injuries increased with age from the 30 to 39 age group (5.6%) before peaking in the 80 to 89 age group (46.2%) and decreasing in the 90-plus age group (35.3%). There was a significant positive correlation between age in years and presence of pressure injuries in evidence on the survey date, r = .183, n = 370, $p < .01$; the older the patient the more likely they were to have at least one pressure injury. Note that although prevalence was 25% for the age group of 20 to 29 years, these results should be interpreted with caution because there were only four participants in this group.

Not all pressure injuries were hospital-acquired as some patients were admitted with pre-existing injuries. Both patients with pressure injuries in the 20 to 39 year age group acquired them after admission, one of the two patients in the 40 to 49 year age group acquired the injury after admission, as did four of the five in the 50 to 59 year age group, five out of seven in the 60 to 69 year age group acquired them after admission, as did 16 out of the 25 in the 70 to 79 year group, as did 19 out of 24 in the 80 to 89 year age group and five out of six in the 90-plus age group.

The relationships between evidence of pressure injuries and a range of demographic and clinical factors were tested (Table 2).

Older age ($\chi 2\,(1, 241) = 13.789$, $p < .0001$), a principal diagnosis of cancer ($\chi 2\,(1, 240) = 13.446$, $p < .0001$) and the inability to reposition independently ($\chi 2\,(1, 220) = 20.663$, $p < .0001$) were all found to be significantly related to the existence of pressure injuries. Only those risk factors that were significant at $p < 0.2$ were selected for the logistic regression model.

Table 1. Pressure injury bodily locations and severity Cabrini Health PUPPS1.

Body part	Stage 1	Stage 2	Stage 3	Stage 4	Total	(%)
Heel	42	1	1		44	(24.2)
Toes*	26	7			33	(18.1)
Sacrum	23	4		3	30	(16.5)
Elbow	13	2		1	16	(8.8)
Buttocks	11	4		1	16	(8.8)
Foot	9	1			10	(5.5)
Leg	9			1	10	(5.5)
All other locations**	11	7		4	23	(12.6)
Total	145	26	1	10	182	100.0

*One patient had 10 Stage 1 toe pressure sores

** See Appendix G for specific locations

Table 2. Comparison of pressure injury prevalence by clinical factors between PHS PUPPS1 and VicPUPPS1.

Factor	Patients seen	Patients with pressure injury	PHS prevalence (%)	P value between factors in PHS
Sex				
Male	97	26	26.8	
Female	143	43	30.1	p = .583 NS*
Admission				
Elective	117	33	28.2	
Emergency	107	33	30.8	p = .666 NS
Principal diagnosis* **				
Not cancer	195	46	23.6	
Cancer	43	22	51.2	p < .001 S
Diabetes as a comorbidity* **				
No diabetes	217	60	27.8	
Diabetes	33	9	27.3	p = .859 NS
Independently reposition				
Able	192	44	22.9	
Unable	28	18	64.3	p < .0001 S

* NS not significant
** S significant
*** For full details of clinical factors, see Appendix H

A logistic regression analysis was performed on evidence of pressure injury as an outcome with three predictors: aged 50 years or older, having a pre-existing diagnosis of cancer and being unable to independently position oneself. After deletion of 25 cases with missing data, a total of 217 cases remained in the analysis. Table 3 shows regression coefficients, odds ratios and 95% confidence intervals (CI) for each of the three predictors.

All risk factors were entered into the model at the same time. The Hosmer and Lemeshow Test was not significant suggesting that the model adequately fitted with the data ($\chi 2$ (3, 242) = 1.23, p == .745). All factors remained significant with the inability to reposition being most likely to influence acquisition of pressure injuries, followed by older age then having a principal diagnosis of cancer (Table 2). Therefore patients who were unable to reposition, regardless of their age or whether they had cancer, were over five times more likely to acquire pressure injuries than patients who were able to reposition. Patients 50 years and over, regardless of their ability to reposition or whether they had cancer, were over four times more likely to acquire pressure injuries than patients aged under 50 years. Lastly, patients who had a primary diagnosis of cancer, regardless of their ability to reposition or their age, were over three times more likely to acquire pressure injuries than those patients without cancer.

In summary, the pressure injury point prevalence conducted at this busy, private, multi-site health service resulted in an overall prevalence of 28.2%. However, when stage one injuries were excluded, the prevalence decreased to 9.9%. When adjusted for all other influences, the main risk factors associated with the development of pressure injuries were the inability to reposition independently, older age and having a diagnosis of cancer.

Table 3. Logistic regression analysis of pressure injury as a function of risk factors.

Risk factors	B	Odds Ratio	Significance	95% C I for odds ratio Upper	Lower
Inability to reposition independently	1.718	5.575	.000	2.314	13.433
Older age	1.526	4.598	.008	1.500	14.091
Principal diagnosis of cancer	1.222	3.392	.002	1.546	7.444

N = 217. Model $\chi 2$: 40.613, df (3, 242), p =< .0001

Discussion

The first Pressure Ulcer Point Prevalence survey was conducted over three campuses of a busy, metropolitan private healthcare provider. The survey was conducted to determine the prevalence of pressure injuries in inpatients and to establish baseline indicators. These findings will enable the identification of patients most at risk and may will inform future interventions targeting those patients most at risk of developing pressure injuries. Additionally, these findings enable comparisons to be drawn within this PHS over time and between this PHS and public healthcare services.

The overall prevalence including all injuries from stage one to stage four for the PHS (28.2%) was similar to VicPUPPS1 (26.5%) and higher than VicPUPPS2 (20.8%). This result was expected as the prevalence recorded in the two initial prevalence studies (PHS & VicPUPPS1) are both baseline measures whereas VicPUPPS2 was completed after recommendations for improved outcomes were made. Furthermore, the reasons given for non-participation in the skin examination were comparable to VicPUPPS1 figures where 52.6% (compared to 38.2% for this study) of patients declined to give their consent, 18.6% (29.1%) were too ill and 28.8% (32.7%) cited some other reason. Statewide PUPPS1 and PUPPS2 report similar reasons for refusal in the two studies. However, the actual compliance rates differed between this PUPPS (70%) and the two statewide studies (PUPPS1 = 86%; PUPPS2 = 87%). The similarity in prevalence, combined with the similarity in reasons given by patients for non-participation, ensured a comparability of findings.

When stage one injuries were excluded, prevalence for the PHS (9.9%) was much lower than prevalence for VicPUPPS1 (17.1%). Possible explanations for this lower prevalence may include different patient demographics and potentially different foci in nursing care. The PHS is a private provider and, thus, patients are likely to be from a higher socio-economic group. People from lower socio-economic circumstances are restricted in their ability to make healthy food and lifestyle choices [35]. Conversely, increased affluence is associated with better nutrition, increased access to medical attention and generally being able to afford more personalised assistance with self-care [36]. Another possible explanation for the lower level of stages two to four injuries is that pressure injury surveillance and prevention may be a particular focus of nursing at this facility therefore injuries are detected early and appropriate care provided thus preventing progression to stage two injuries. This is a speculative but plausible explanation; however, more research is needed to confirm these reasons or to provide evidence for other unknown reasons.

In order to pinpoint areas of high prevalence, patients were grouped by medical specialty as some areas comprised patients more likely to acquire pressure injuries. However, caution must be exercised when interpreting the findings as patient numbers in some specialty areas were low. Higher prevalence was recorded in the areas of oncology, palliative care and surgery. It must be noted that many of the cancer patients in this study underwent surgery related to their diagnosis. As this, and other studies, has shown lack of mobility, older age, chronic illness and poor nutrition [8, 24, 26] are risk factors in pressure injuries; therefore, extra care is needed in managing these patients. Added to these factors, a higher prevalence has been associated with the forces of sheer and friction experienced by patients during surgery [27]. A systematic review found that specialised foam overlays on operating tables reduced the incidence of pressure injury and concluded that some pressure injuries can develop during surgery [37]. Thus the surgical patients of the PHS require special attention as their needs are complex and their risk levels increased.

Whilst medical specialty provides some explanation for pressure injury development, examination of other demographic and clinical factors also provides guidance as to pressure injury risk profile. Our results suggest that, even when adjusted for older age and chronic illness, the factor most strongly related to pressure injuries was the inability to reposition. Also when adjusted for inability to reposition and chronic illness, patients aged 50 years and older are more likely to show evidence of pressure. Lastly, regardless of the inability to reposition and age of patient, a principal diagnosis of cancer is also associated with increased presence of pressure injuries. In addition to cancer patients generally being in the older age groups, this particular PHS performed surgical procedures on patients with cancer and provided a palliative care service whose main population had cancer, thus the risk of developing pressure injuries was compounded by all these factors. Thus, interventions aimed at pressure injury reduction must be initiated when patients are rendered immobile for any amount of time. In summary, this study found that older, cancer patients who were unable to reposition independently were most likely to record pressure injuries than any other group of patients. Indeed being unable to reposition independently is the most important factor associated with occurrence of pressure injuries.

The ability to reposition is assessed through completion of the Braden Scale. It is, therefore, imperative that the Braden Scale be completed fully and accurately. Both the Braden scores recorded on admission and those recorded during the prevalence study were recoded into levels of risk. Contrary to the information on the PHS nurses' admission form but in accordance with the literature, patients aged 75 and above were considered at risk of developing a pressure injury at a Braden score of 18 or below and patients under 75 years were considered at risk when their Braden score was 16 or below [23]. These cut-off scores produce optimal scale sensitivity and specificity leading to more accurate identification of the at-risk population [29, 38]. Theses at-risk populations require interventions aimed at reducing the likelihood of developing a pressure injury or to arrest the worsening of an existing pressure injury. Interventions include use of pressure relieving devices.

Considering that the inability to reposition is one contributing factor to increased risk of developing pressure injury, one economical and effective intervention is the use of pillows or wedges. Positioning wedges can be used to relieve pressure on body parts of an inactive patient [24]. A key recommendation from VicPUPPS1 was that all mattresses in hospitals be ungraded to a set, minimum standard, pressure reduction foam mattress [16]. The utility of this recommendation is further strengthened through evidence obtained in the systematic review by Reddy *et al*. [37]. They found several studies where the use of specialised foam mattresses rather than standardised hospital mattresses was related to a lower incidence of pressure injuries. In all cases, education is the key to matching a particular patient's needs with the appropriate choice of device.

As a consequence of the pressure injury point prevalence survey, recommendations both for future point prevalence surveys and practice change were formulated. It was recognised that a higher participation rate would improve the accuracy of future studies and future studies would gauge the effectiveness of interventions. Therefore recommendations included the need to devise and implement strategies aimed at increasing participation prior to the 2008 survey.

Some of the major recommendations for practice change included:

- Place any patient unable to reposition independently on a pressure-relieving mattress or device.
- The cut-off scores for risk levels contained in the nursing admission form, where patients are deemed to be at risk with a score of 16 or below, should be altered in accordance with the literature; that is, that patients aged 75 years and older are at risk at a score of 18 or below and for all other patients the risk score remain 16 and below.
- Further exploration is needed to be undertaken into the pattern of pressure injury prevalence in patients who undergo surgery.
- Education, motivation and reinforcement of nursing staff are provided about the use and utility of the Braden Scale.

Limitations

Not all the eligible population was captured and so the obtained results may not reflect the true characteristics of the inpatient population. Prevalence is based on the number of consenting participants and the number of cases detected. Therefore, higher participation translates to a more accurate measure of prevalence. The non-participation rate in this study was approximately 30%, which was about double the non-participation rate of both VicPUPPS1 and VicPUPPS2. However, comparisons between the PHS and the two Victorian statewide PUPPS remain valid because the distribution of patterns of reasons for non-participation is similar. Additionally the use of similar methodology including education, training, method of data collection and survey tool in this study and the two VicPUPPS studies adds validity and reliability to the comparisons.

Conclusion

This first pressure injury point prevalence survey was successfully conducted at a metropolitan Australian private healthcare facility. The survey findings provided empirical evidence as to the characteristics of patients most at risk of having pressure injuries and the specialty areas where pressure injury prevalence is higher. For patients in this study the local factors related to pressure injury acquisition were the inability to reposition, older age and being diagnosed with cancer. Many clinical recommendations were developed from the study findings. These recommendations included providing pressure-relieving devices to all patients unable to reposition independently, alteration of the Braden Scale risk score used on admission to identify older patients at risk from 16 to 18, in accordance with published literature, greater attention to be paid to patients undergoing surgery and further education about use of the Braden Scale and pressure relieving devices to be provided to nurses. This study has also highlighted the need for further investigation into the reasons for non-participation in research and into the direct and indirect relationships between surgery and acquisition of pressure injuries.

Acknowledgements

Thank you to staff and patients on all wards who participated in this project.

Special thanks goes to Ms Kathy Jones and all the nurses who acted as data collectors: Sharlene Fraser, Lisa Bruck Andrea Furness, Stephanie Lazaro, Jane Burgess, Sarah Smith, Erin Creedon, Zhang Lee, Louise Temminghoff, Gillian Miles, Fiona Kirwan, Anna Geller, Sarah Matthews, Lauren Todorovic, Averil Romari, Marielyn Vincente, Fiona Bromley, Erin Williams, Amy Tonkin, Catherine Stevens, Rhiannan Lavars, Amanda Quinlan, Kristy Fletcher, Yvette Wood, Sarah Portelli, Amalie Garnham.

The cost of release of data collectors on the day of the point prevalence was internally funded by Nursing Services.

The inter-rater reliability test tool, developed by Prentice, Stacey and Lewin was modified and used with permission from JL Prentice and the Victorian Quality Council 2006. It was adapted for use by staff of the Cabrini Clinical Education and Research Institute.

The Pressure Ulcer Point Prevalence Survey Tool is copyright 2000 JL Prentice Project UWA and was modified and used with permission from JL Prentice and the Victorian Quality Council 2006. It was adapted for use by staff of the Cabrini Clinical Education and Research Institute.

References

1. Defloor T & Grypdonck MFH. Pressure ulcers: validation of two risk assessment scales. J Clin Nurs 2005 ;**14**(3):373-82.
2. Graves N, Birrell FA & Whitby M. Modelling the economic losses from pressure ulcers among hospitalised patients in Australia. Wound Repair Regen 2005 ;**13**(5):462-7.
3. Szor J & Bourguignon C. Description of Pressure Ulcer Pain at Rest and at Dressing Change. J Wound Ostomy Continence Nurs 1999; **26**(3):115-20.
4. Spilsbury K, Nelson A, Cullum N, Iglesias C, Nixon J & Su M. Pressure ulcers and their treatment and effects on quality of life: hospital inpatient perspectives. J Adv Nurs. 2007; **57**(5):494-504.
5. Victorian Quality Council. VQC Statewide PUPPS 2 Report 2004: Pressure ulcer point prevalence survey. Melbourne, VIC: Metropolitan Health and Aged Care Services Division Victorian Government Department of Human Services, 2005.
6. Jacquot JM, Pelissier J, Finels H & Strubel D. Epidemiology and cost of pressure sores in geriatrics. Presse Med 1999; **28**(33):1854-60.
7. Voss AC, Bender SA, Ferguson ML, Sauer AC, Bennett RG & Hahn PW. Long-term care liability for pressure ulcers. J Am Geriatr Soc 2005; **53**(9):1587-92.
8. Australian Wound Management Association. Clinical Practice Guidelines for the Predication and Prevention of Pressure Ulcers. West Leederville, Perth: Cambridge Publishing, 2001.
9. Gunningberg L. Are patients with or at risk of pressure ulcers allocated appropriate prevention measures? Int J Nurs Pract 2005; **11**(2):58-67.
10. Whittington KTM & Briones RB. National Prevalence and Incidence Study: 6-Year Sequential Acute Care Data. Adv Skin Wound Care 2004; **17**(9):490-494.
11. Runy LA. The Bad News About Bed Sores. Hosp Health Netw 2005; **79**(8):28.
12. Lahmann NA, Halfens RJG & Dassen T. Prevalence of pressure ulcers in Germany. J Clin Nurs 2005; **14**(2):165-72.
13. Bours G, Halfens R, Abu-Saad H & Grol R. Prevalence, prevention and treatment of pressure ulcers: descriptive study in 89 institutions in The Netherlands. Res Nurs Health 2002; **25**(2):99-110.
14. Allcock N, Wharrad H & Nicolson A. Interpretation of pressure-sore prevalence. J Adv Nurs 1994; **20**(1):37-45.
15. Pearson A, Francis K, Hodgkinson B, Curry G & Pearson PA. Prevalence and treatment of pressure ulcers in northern New South Wales. Aust J Rural Health. 2000; **8**(2):103-10.
16. Victorian Quality Council. VQC Statewide PUPPS 1 Report 2003: Pressure ulcer point prevalence survey. Melbourne, VIC: Metropolitan Health and Aged Care Services Division Victorian Government Department of Human Services, 2004.
17. Prentice JL, Stacey MC & Lewin G. An Australian model for conducting pressure ulcer prevalence surveys. Primary Intention 2003; **2**(2):87-109.
18. Bowman KG & Ruchala PL. A comparison of the postpartum learning needs of adolescent mothers and their mothers. J Obstet Gynecol Neonatal Nurs 2006; **35**(2):250-6.
19. McKee M, Whatling JM, Wilson JL & Vallance-Owen A. Comparing outcomes of cataract surgery: challenges and opportunities. J Pub Health. 2005; **27**(4):348-52.
20. An K, De Jong MJ, Riegel BJ, McKinley S, Garvin BJ, Doering LV *et al*. A cross-sectional examination of changes in anxiety early after acute myocardial infarction. Heart Lung 2004; **33**(2):75-82.
21. Hunt R, Bonett A & Roder D. Trends in the Terminal Care of Cancer-Patients – South-Australia, 1981-1990. Aust N Z J Med 1993; **23**(3):245-51.

22. Zib M & Gani J. Inguinal hernia repair: Where to next? ANZ J Surg 2002; **72**(8):573-9.
23. Lyder CH, Yu C, Emerling J, Mangat R, Stevenson D, Empleo-Frazier O *et al*. The Braden scale for pressure ulcer risk: evaluating the predictive validity in black and Latino/Hispanic elders. Appl Nurs Res 1999; **12**(2):60-8.
24. Maklebust J. Pressure ulcers: Decreasing the risk for older adults. Geriatr Nurs 1997; **18**(6):250-4.
25. Roberts BV & Goldstone LA. Survey of Pressure Sores in the over 60s on 2 Orthopedic Wards. Int J Nurs Stud 1979; **16**(4):355-64.
26. Thoroddsen A. Pressure sore prevalence: a national survey. J Clin Nurs 1999; **8**(2):170-9.
27. Schoonhoven L, Defloor T, I, Buskens E & Grypdonck M. Risk indicators for pressure ulcers during surgery. Appl Nurs Res 2002 ; **15**(3):163-73.
28. Fisher AR, Wells G & Harrison MB. Factors Associated With Pressure Ulcers in Adults in Acute Care Hospitals. Holist Nurs Pract 2004; **18**(5):242-53.
29. Bergstrom N, Demuth PJ & Braden BJ. A Clinical Trial of the Braden Scale for Predicting Pressure Sore Risk. Nurs Clin North Am 1987; **22**(2):417-28.
30. Pancorbo-Hidalgo PL, Garcia-Fernandez FP, Lopez-Medina IM & Alvarez-Nieto C. Risk assessment scales for pressure ulcer prevention: a systematic review. J Adv Nurs 2006; **54**(1):94-110.
31. Seongsook RNJ, Ihnsook RNJ & Younghee RNL. Validity of pressure ulcer risk assessment scales; Cubbin and Jackson, Braden and Douglas scale. Int J Nurs Stud 2004; **41**(2):199-204.
32. Kwong E, Pang S, Wong T, Ho J, Shao-ling X & Tao L-j. Predicting pressure ulcer risk with the modified Braden, Braden and Norton scales in acute care hospitals in Mainland China. Appl Nurs Res; **18**(2 (Print)):122-8.
33. Greenland S. Introduction to regression modelling. In: Rothman K & Greenland S, eds. Modern Epidemiology, 2nd edn, Philadelphia, USA: Lippincott Williams & Wilkins, 1998; 401-32.
34. National Health and Medical Research Council. When does Quality Assurance in Health Care Require Independent Ethical Review? 2003 [cited 3 December 2008]; Available from: http://www.nhmrc.gov.au/publications/synopses/e46syn.htm
35. Lester IH. Australia's food and nutrition. Canberra, Australia: Australian Government Publishing Service, 1994.
36. Australian Institute of Health and Welfare. Australia's health 2008. Canberra, Australia: AIHW, 2008.
37. Reddy M, Gill SS & Rochon PA. Preventing Pressure Ulcers: A Systematic Review. [Review]. JAMA 2006; **30**:296(8):974-83.
38. Bergstrom N, Braden B, Kemp M, Champagne M & Ruby E. Predicting pressure ulcer risk – A multi-site study of the predictive validity of the Braden Scale. Nurs Res 1998; **47**(5):261-9.