

PUPPS 3— Pressure ulcer point prevalence survey

Statewide report 2006



PUPPS

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Data collected from Victorian public health services

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Executive summary

As an internationally acknowledged patient safety problem, pressure ulcers are increasingly recognised as a clinical indicator of the quality of care provided^{1,2}. Pressure ulcers are caused by unrelieved pressure; shear forces and friction, which result in damage of the skin and underlying tissue. Damage can range from a mildly painful reddened area to debilitating full skin thickness ulcers with associated muscle and bone injury and in some instances to osteomyelitis and death^{2,3}. Pressure ulcers are largely preventable and can be viewed as an adverse outcome of a healthcare admission^{4,5}.

Patients, families, health services and the community can be significantly impacted by the detrimental social, physical and financial consequences of pressure ulcers. Patients experience pain, disfigurement, disability and loss of independence. Healthcare budgets expend billions of dollars worldwide on prevention and treatment of patients with extended hospital stays from pressure ulcer development⁶.

In an effort to quantify the magnitude of this patient safety issue in Victorian public hospitals, the Victorian Quality Council (VQC) undertook the first state-wide pressure ulcer point prevalence survey (PUPPS 1) in 2003. PUPPS 1 identified a prevalence of 26.5%, 1 in 5 patients with a pressure ulcer and 2/3 of those ulcers being acquired during the hospital admission. Based on the data collected, current best practice and literature, recommendations to improve pressure ulcer prevention and management were detailed⁷.

A second survey was undertaken by VQC in 2004 (PUPPS 2) and health services achieved a 21.5% decrease in pressure ulcer prevalence, recording a mean state-wide prevalence of 20.8% though 2/3 of the ulcers were still identified as hospital acquired. At the time of the PUPPS 2 survey, health services had made progress towards reducing pressure ulcer development through implementing elements of a comprehensive program of pressure ulcer prevention and management. Additional recommendations prompted health services to implement a prevention program, focus their resources and efforts on target areas that showed the greatest need and to sustain their improvement with clinical risk reporting, review and evaluation⁸.

A third state-wide pressure ulcer point prevalence survey has been completed and Victoria has recorded a state-wide mean prevalence of 17.6%. Since the first pressure ulcer point prevalence survey (PUPPS), conducted by the Victorian Quality Council (VQC) in 2003 there has been a 33% reduction in the proportion of patients with pressure ulcers in our acute and subacute facilities. As well as finding fewer patients with ulcers, PUPPS 3 identified fewer patients with multiple ulcers. The survey identified 2,100 ulcers on 1,222 patients with 59.6% involving more than superficial skin damage.

The use of a risk assessment tool (RAT) to identify patients at risk of developing pressure ulcers is acknowledged as best practice in most clinical guidelines on pressure ulcer prevention and management. Almost 2/3 of the surveyed population had evidence of a risk assessment tool (RAT), an increase of 13.2% from PUPPS 2 and 25.1% since PUPPS 1.

There was an increase in the use of pressure reducing devices across the surveyed population including a 22.3% increase in the proportion of patients with a reducing/relieving device insitu and 17.6% increase in the number of patients with pressure ulcers who had a device insitu. Of the patients identified with pressure ulcers 77.2% had a device insitu.

An increase in documentation related to pressure ulcer management was noted, with 86.7% and 87.5% of Stage 3&4 ulcers documented in the medical record.

There was an increase in positive responses in almost all contextual data measures from PUPPS 1 to PUPPS 2&3. The number of health services with existing protocols and policies on pressure ulcer prevention and management doubled from 35.4% in PUPPS 1 to 71.3% in PUPPS 3. Health services also achieved significant increases in the use of patient literature and individual prevention plans. More health services had mattress replacement programs; and more were routinely collecting pressure ulcer data as part of their clinical risk management programs.

Showing little or no change from previous surveys, 2/3 of the ulcers were hospital acquired. Patients with pressure ulcers had a longer time from admission to survey than patients without ulcers. Patients 60 years of age and over represented 80.8% of those identified with a pressure ulcer and ulcers were identified in 28 paediatric patients (less than 18 years of age), accounting for 2.3% of all patients with ulcers.

Opportunities for future improvement are identified with the inability to independently reposition again being the primary associative risk factor for developing a pressure ulcer.

For the PUPPS 3 population, the prevalence of ulcers was 2.6 times higher in patients unable to reposition than in those who were able to reposition.

Recommendations for health services suggest building a strong emphasis on the prevention of hospital acquired pressure ulcers with a commitment from all levels of the organisation. Health services need to continue the use of risk assessment-based individual prevention plans for patients that contain skin care, pressure reducing support surfaces, turning regimes, nutrition and education. Strategies to decrease patient immobility and increase opportunities to reposition should take a high priority.

Health services should continue to collect information on pressure ulcers and include prevalence and incidence data to inform their strategic planning, resource allocation and to track improvement.

The department should build an expectation of continued improvement and sustainability into state health policy. This should be supported by facilitating prevalence and incidence surveys and research into pressure ulcer prevention and management. The department should undertake work with key organisations to improve the education, prevention and management of pressure ulcers for staff involved in caring for patients.

Victoria has again set the benchmark for the collection and distribution of state-wide pressure ulcer prevalence data. This methodology of data collection and reporting could be used on a national scale, leading to even greater reduction in pressure ulcer development and position Australia as a leader in pressure ulcer prevention and management.

Victoria has shown it can achieve a reduction in pressure ulcer prevalence and has taken comprehensive steps to sustain the improvement. A stronger focus on prevention is still needed; pressure ulcers need to be seen as preventable rather than inevitable. Investment in prevention by systematically addressing improvement through organisational change is essential. The preventive elements that can be implemented quickly have generally been accomplished or are well on the way to being implemented.

Through the clinical governance model that frames quality improvement in Victoria, health services now require systemic organisational change so that maintenance of skin integrity is seen as the routine responsibility of staff at all levels of the health service.

Victorian public hospitals are in an ideal position to continue to improve their pressure ulcer prevention and minimise harm from this patient safety issue.

Introduction

Pressure ulcers are recognised worldwide as one of the 5 most common causes of harm to patients¹, a largely preventable patient safety problem and increasingly described as an indicator of the quality of care provided by health care organisations².

A pressure ulcer is defined as ‘any lesion caused by unrelieved pressure that results in damage to the underlying tissue. This short and simplistic definition belies the complexity and significance of this type of wound’³. Pressure ulcers have detrimental physical, social and financial consequences for individuals, health services and the community. Pressure ulcers are almost always painful, can cause scarring; require surgical intervention, extended stays in hospital and in some cases leads to death^{9,10}. ‘Susceptibility to pressure ulcers comes from a combination of external factors (pressure, friction, shear force, and moisture), and internal factors (e.g. fever, malnutrition, anaemia, and endothelial dysfunction)’⁶. Damage can occur with as little as 2 hours immobility, which may begin before contact with the health service and recurrence rates for pressure ulcers can be as high as 90%⁶.

Pressure ulcers have been recorded since 2050 to 100 BC¹², ‘observed in unearthened human mummies and addressed in scientific writings of the 19th century’⁶. Today, despite being largely preventable, they affect millions of people worldwide and consume billions of dollars in healthcare spending⁶. Examples of international expenditure associated with pressure ulcers* are:

- 3.2% of the total healthcare expenditure in the United Kingdom, ‘one of the five largest expenditures in the National Health Service (NHS) non-pay budget’, estimated to cost the NHS AU\$608m (approx) each year^{12,14,15};
- 1.6 million patients in the United States develop hospital acquired pressure ulcers annually at a cost of AU\$2.9 to \$4.7b (approx)¹⁴;
- the fourth most expensive disease in the Netherlands with ‘more than 1% of the total budget for health care spent on prevention and treatment of pressure ulcers or prolonged hospital stay once a pressure ulcer develops’^{15,16}; and
- 5.2% of Spain’s total healthcare expenditure, AU\$2.1m (approx)¹³.

* International comparison should be made cautiously due to differences in health care systems. AU\$ approximation as of 31/07/06.

In Australia, a recent study predicted an annual ‘95,695 cases of pressure ulcers with a median of 398,432 bed days lost, incurring median costs of AU\$285M ... a serious clinical and economic problem for a resource-constrained public hospital system’¹⁷. In PUPPS 2 it was estimated that patients with pressure ulcers accounted for 44,406 additional bed days in Victorian public hospitals with a risk adjusted cost of approximately \$19 million⁸.

Victoria and PUPPS

In 2003 the Victorian Quality Council (VQC), as part of their strategic plan to address this issue, undertook the first state-wide pressure ulcer point prevalence survey, PUPPS 1, to identify the magnitude of the problem in Victoria. PUPPS 1 identified a state-wide prevalence of 26.5%, which was considerably higher than comparable international surveys. Hospital acquired pressure ulcers accounted for 2/3 of the ulcers identified, immobility was the primary associative risk factor and a diverse range of clinical practices for prevention and management were found to be in use across the state. The findings of PUPPS 1 indicated the need for state and organisation-wide strategies to elevate pressure ulcer prevention and management as a priority and to systematically address the issue⁷.

As a consequence of recommendations from PUPPS 1, \$2 million in government funding was provided for a state-wide Mattress Replacement Program (which also developed a minimum technical specification for static pressure reduction foam mattresses). Several PUPPS 1 recommendations were also included in the Department of Human Services (DHS) Policy and Funding Guidelines, and patient information literature and a clinical staff education package on pressure ulcers were developed.

To track the effectiveness and influence of the recommendations made in the VQC State-wide PUPPS Report—2003, a second survey was undertaken by VQC in 2004 (PUPPS 2). State-wide prevalence identified in PUPPS 2 was 20.8%, a 21.5% decrease in pressure ulcer prevalence. The proportion of hospital acquired pressure ulcers remained approximately 2/3 of the ulcers identified and immobility was again the primary associative risk factor. Many health services had made considerable progress on implementing components of a comprehensive pressure ulcer prevention and management program.

In Victoria PUPPS helped raise awareness of the cause and effects of pressure ulcers on patients and public hospitals and is beginning to highlight the benefit of investing in comprehensive prevention programs. Direct costs of treatment for hospital acquired pressure ulcers have been estimated at 2.5 times the cost of prevention¹⁴. A successful prevention strategy involves a multifactorial and multidisciplinary approach² and can be broadly outlined in the following 4 steps:

- (i) identify at-risk individuals needing prevention and the specific factors placing them at risk;
- (ii) maintain and improve tissue tolerance to pressure in order to prevent injury;
- (iii) protect against the adverse effects of pressure, shear and friction; and
- (iv) improve the outcome for patients at risk of pressure damage through educational programs to health-care providers, patients and family¹⁸.

PUPPS 3

The overall aim of PUPPS 3 was to conduct a state-wide point prevalence survey of pressure ulcers, using a collaborative and educative approach. This has resulted in the production of reports at both state-wide and individual health service level that provide current and comprehensive information on pressure ulcer prevalence and practice in Victorian health services.

The Department of Human Services (DHS) engaged Austin Health in partnership with the Clinical Epidemiology and Health Service Evaluation Unit, Melbourne Health (CEHSEU) to plan, manage and report on the third Victorian state-wide pressure ulcer point prevalence survey (PUPPS 3). The project team were required to communicate with over 90 site coordinators, provide training and testing for 600 surveyors and supervise the collection of data across 136 metropolitan and rural health service sites. A core team of pressure ulcer experts were seconded to deliver the training and testing and to support health service staff on survey day. An expert reference group with expertise in pressure ulcer prevention, management and education, was convened to oversee the planning, implementation and reporting for the project.

The stated objectives of the project were to use the VQC PUPPS methodology to:

- Determine the point prevalence of pressure ulcers in Victorian public health services;
- Compare the PUPPS 3 data to that collected by VQC in 2003 and 2004;
- Track the level of improvement in pressure ulcer prevention and management through the implementation of the key recommendations from VQC's PUPPS 1&2;
- Provide health services with valid and reliable pressure ulcer prevalence data for benchmarking; and
- Educate and assist health services to reduce pressure ulcers as part of the survey process.

By replicating the methodology used in the two previous surveys, data can be compared across all three datasets with confidence.

Pressure ulcer prevalence is a data snapshot of the scale of the pressure ulcer issue, a measure of the number of patients with a pressure ulcer at a given point in time. Prevalence studies are a 'valuable and constructive aid to identifying the extent of a problem and planning effective use of health resources'. They are a useful tool to collect data for benchmarking specific clinical practices¹⁹. VQC stated the main benefits they sought in conducting the original PUPPS was to 'focus attention on the problem, gain insight into the magnitude of the issue, educate staff, review the allocation and use of resources and, ultimately, to improve patient outcomes'⁷. Together with the contextual information collected as part of each PUPPS on prevention and management strategies used in health services, the combined data comprehensively tracks the progress of health services in their pressure ulcer prevention programs.

Definitions

To maximise consistency throughout the survey methodology, PUPPS 3 utilised the same definitions as PUPPS 1 & 2.

A “Pressure Ulcer” is defined as any lesion caused by unrelieved pressure resulting in damage of the skin and underlying tissue²⁰.

Prevalence is the number of existing cases of a particular disease or condition in a given population at a designated time²⁰. Prevalence as described in this document is the proportion of patients identified with pressure ulcers in the total patients seen.

Incidence is the number of new cases of a particular disease or event in a population during a specific time period²⁰.

Interrater reliability involves testing of surveyors (following their exposure to an education program) to ensure consistency and agreement between surveyors in classifying pressure ulcers as well as engendering reliability in data outcomes.

Pressure ulcers were staged according to the Australian Wound Management Association’s (AWMA) Clinical Practice Guidelines for the Prediction and Prevention of Pressure Ulcers²⁰.

Stage 1—Observable pressure related alteration of intact skin whose indicators as compared to the adjacent or opposite area of the body may include changes in one or more of the following: skin temperature (warmth or coolness), tissue consistency (firm or boggy feel) and/or sensation (pain, itching). The ulcer appears as a defined area of persistent redness in lightly pigmented skin, whereas in darker skin tones, the ulcer may appear with persistent red, blue or purple hues.

Stage 2—Partial thickness skin loss involving epidermis and/or dermis. The ulcer is superficial and presents clinically as an abrasion, blister, or shallow crater.

Stage 3—Full thickness skin loss involving damage or necrosis of subcutaneous tissue that may extend down to but not through underlying fascia. The ulcer presents clinically as a deep crater with or without undermining of adjacent tissue.

Stage 4—Full thickness skin loss with extensive destruction, tissue necrosis or damage to muscle, bone, or supporting structures (for example, tendon or joint capsule). Undermining and sinus tracts may also be associated with Stage 4 pressure ulcers.

See Appendix A for schematic diagrams and clinical photos used in PUPPS 3.

Results

The results of this survey are reported under the following 3 groupings:

‘PUPPS 1’ represents the state-wide data of the 48 health services who participated in PUPPS 1 in 2003.

‘PUPPS 2’ represents the state-wide data of the 84 health services who participated in PUPPS 2 in 2004. (Although 87 health services consented to participate in PUPPS 2, 3 of the 87 health services had no eligible patients on survey day and therefore did not submit any patient data).

‘PUPPS 3’ represents the state-wide data of the 84 health services who participated in PUPPS 3 in 2006. (In 2005, one rural health service became a campus of another rural health service, reducing the state-wide health service number from 87 to 86 but leaving the site numbers unchanged at 136. Although 86 health services consented to participate in PUPPS 3, 2 of the 86 health services had no eligible patients on survey day and therefore did not submit any patient data).

The key findings of the PUPPS 3 survey are summarised below in Table 1. These findings and further results are expanded in the following sections.

Key findings

Prevalence as described in this document is the proportion of patients identified with pressure ulcers in the total patients seen.

Table 1. Key findings

Finding	PUPPS 1	PUPPS 2	PUPPS 3	Change % PUPPS 2 to PUPPS 3 [PUPPS 1 to PUPPS 3]
Summary Data				
Prevalence of patients with pressure ulcers	26.5%	20.8%	17.6%	-3.2 [-8.9]
Proportion of patients with pressure ulcers present on admission (only)	NA	25.9%	24.5%	-1.4 [NA]
Proportion of patients with pressure ulcers acquired in hospital (only)	67.6%	66.2%	67.7%	1.5 [0.1]
Primary associative risk factor	Immobility	Immobility	Immobility	Unchanged
Prevention & Management				
Pressure ulcer risk assessment tool (RAT) completed	40.9%	52.8%	66.0%	13.2 [38.3]
Use of devices in patients with a pressure ulcer	66.1%	59.6%	77.2%	17.6 [11.1]
Documentation of pressure ulcer management	90.2%	45.0%	50.9%	5.9 [-39.3]
Provision of information to patients regarding pressure ulcers	3.7%#	26.5%	66.9%	40.4

This contextual factor was reported for PUPPS 1 at health service level (4.2%), for PUPPS 2&3 at site level.

PUPPS 3 state-wide data

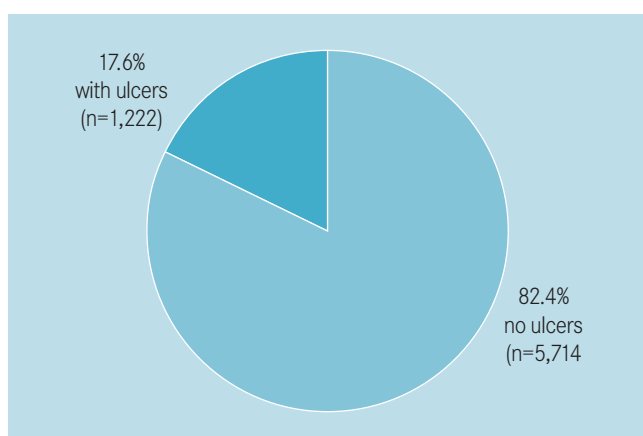
1. Pressure ulcer point prevalence

1.1 State-wide prevalence

PUPPS 3

The prevalence of pressure ulcers identified in PUPPS 3 was 17.6% as represented in Figure 1a below.

Figure 1a. Victorian state-wide prevalence



Comparison with PUPPS 1&2

Table 2a compares the surveyed population and prevalence across PUPPS 1, 2 & 3.

A number of international pressure ulcer prevalence studies do not include Stage 1 pressure ulcers. The prevalence of pressure ulcers excluding stage 1 pressure ulcers is presented below in Table 2b.

Table 2a. Victorian state-wide prevalence

Group	Patient population	Patients refused	Patients seen	Patients with ulcers	Prevalence	95% confidence interval of prevalence
PUPPS 1	6,003	853	5,150	1,367	26.5%	25.3%-27.7%
PUPPS 2	7,621	980	6,641	1,381	20.8%	19.8%-21.8%
PUPPS 3	7,944	1,008	6,936	1,222	17.6%	16.7%-18.5%

Table 2b. Victorian state-wide prevalence (excluding Stage 1 pressure ulcers)

Group	Patient population	Patients refused	Patients seen	Patients with ulcers	Prevalence	95% confidence interval of prevalence
PUPPS 1	6,003	853	5,150	882	17.1%	16.1%-18.2%
PUPPS 2	7,621	980	6,641	976	14.7%	13.9%-15.6%
PUPPS 3	7,944	1,008	6,936	808	11.6%	10.8%-12.3%

Figure 1b shows the change in prevalence from PUPPS 1 (26.5%) to PUPPS 3 (17.6%) of - 8.9 % (95% CI - 7.4 % to - 10.4 %). This is an improvement of 33.6 %. The figure also shows the change in prevalence from PUPPS 2 (20.8%) to PUPPS 3 (17.6%) of - 3.2% (95% CI - 1.9 % to - 4.5%), an improvement of 15.4 %.

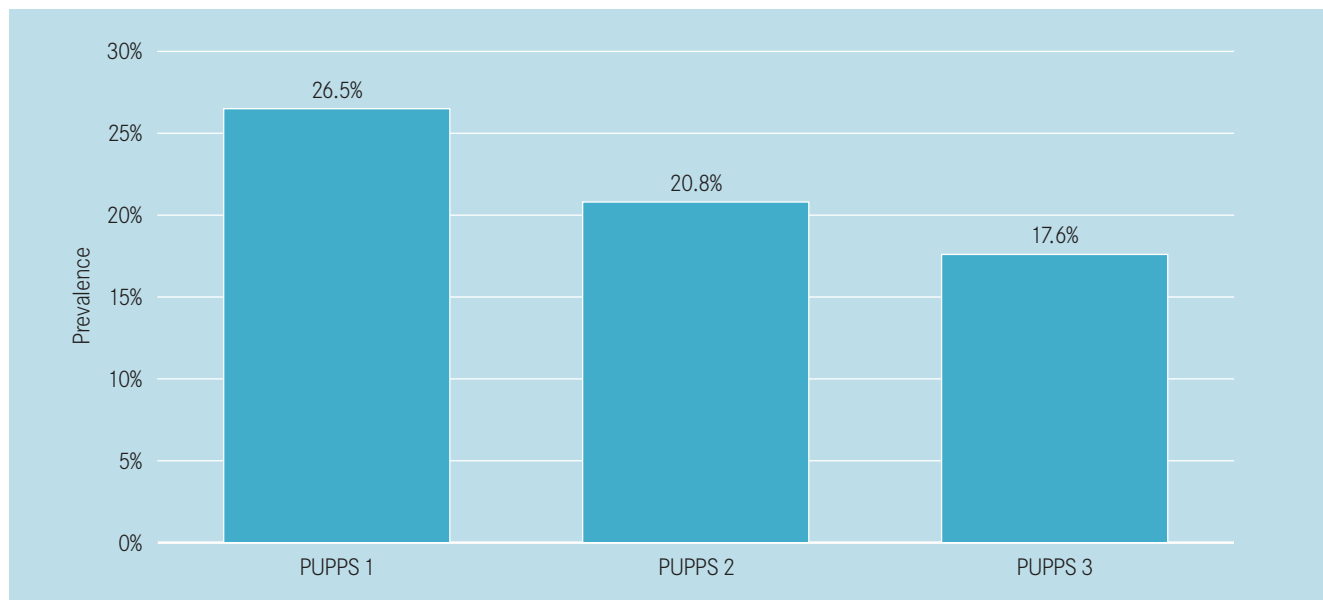
1.2 Pressure ulcer prevalence by health service

PUPPS 3

Although 100% (n = 86) of Victorian health services participated in PUPPS 3, only patient data for 84 health services are included in the analysis, as 2 health services had no eligible patients on survey day and therefore had no data to submit. The proportion of patients found with ulcers in the total patient population seen was 17.6% with a range of 0.0% to 100.0%. See Figure 2a below.

Sixteen health services (17 individual campuses) identified 0% prevalence, which is represented as a single data point in Figure 2a. In addition, a further 12 individual campuses from other health services identified 0% prevalence. These 29 individual campuses combined surveyed a total of 162 patients, seeing a range of 1 to 19 patients. Graphs 2b and 2c show prevalence by health service and by campus respectively by number of patients seen.

Figure 1b. Change in state-wide prevalence



Health services that recorded prevalence greater than 30% had between 1 and 15 patients total population surveyed. In these health services small changes in the number of patients with or without ulcers correspond to a large change in organisational prevalence. The health service that recorded 100% prevalence had 1 patient surveyed who was found to have 1 pressure ulcer, which had been present on admission.

Comparison with PUPPS 1&2

The range of prevalence has increased from PUPPS 1 (5.6% to 48.4%) and PUPPS 2 (0.0% to 60.0%).

More detailed information on the survey population and prevalence by health service is shown in Appendix C.

Figure 2a. Pressure ulcer prevalence by health service

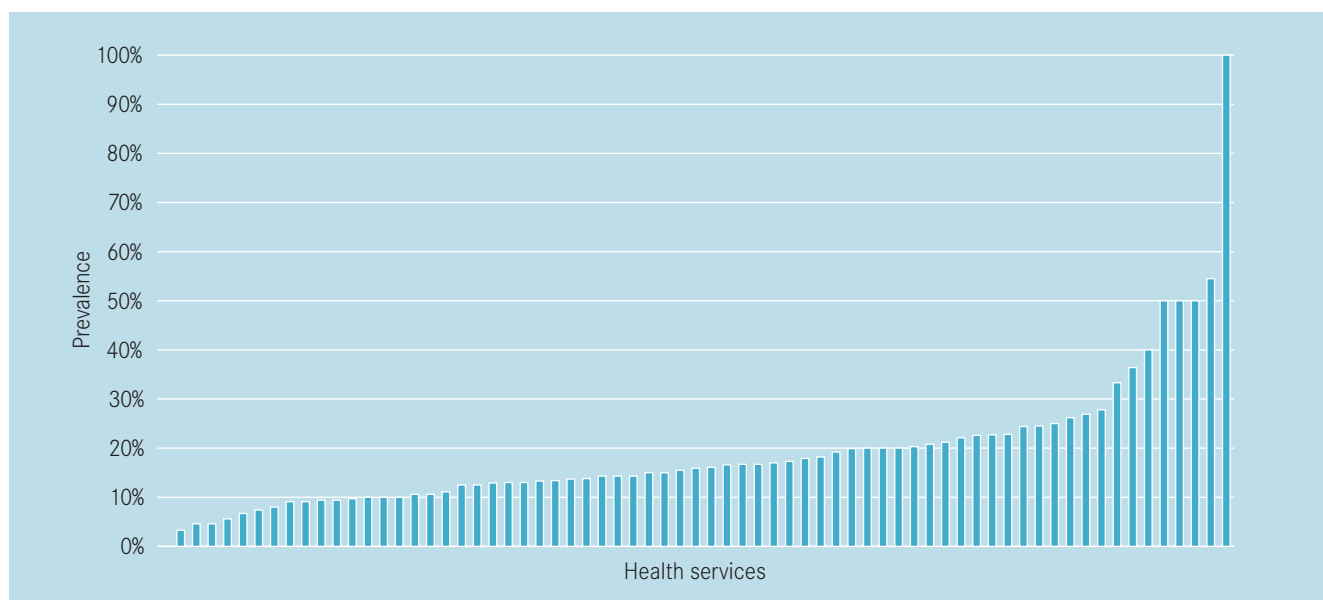


Figure 2b. Prevalence by health service by number of patients seen

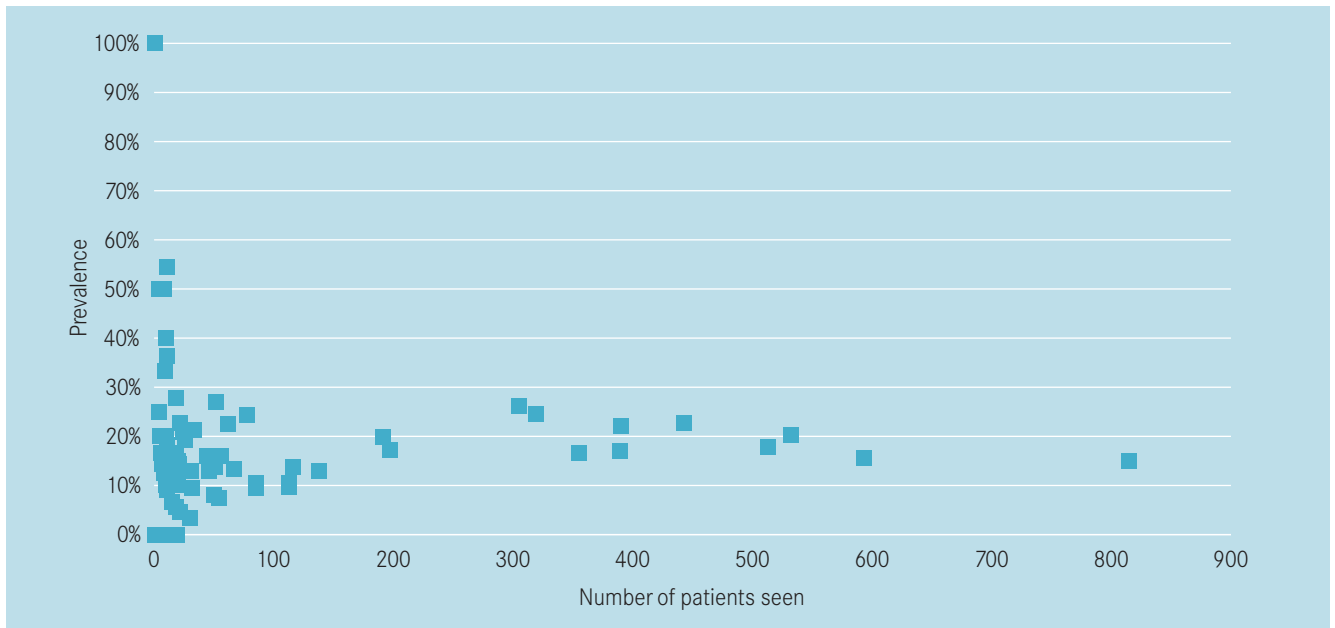


Figure 2c. Prevalence by campus by number of patients seen

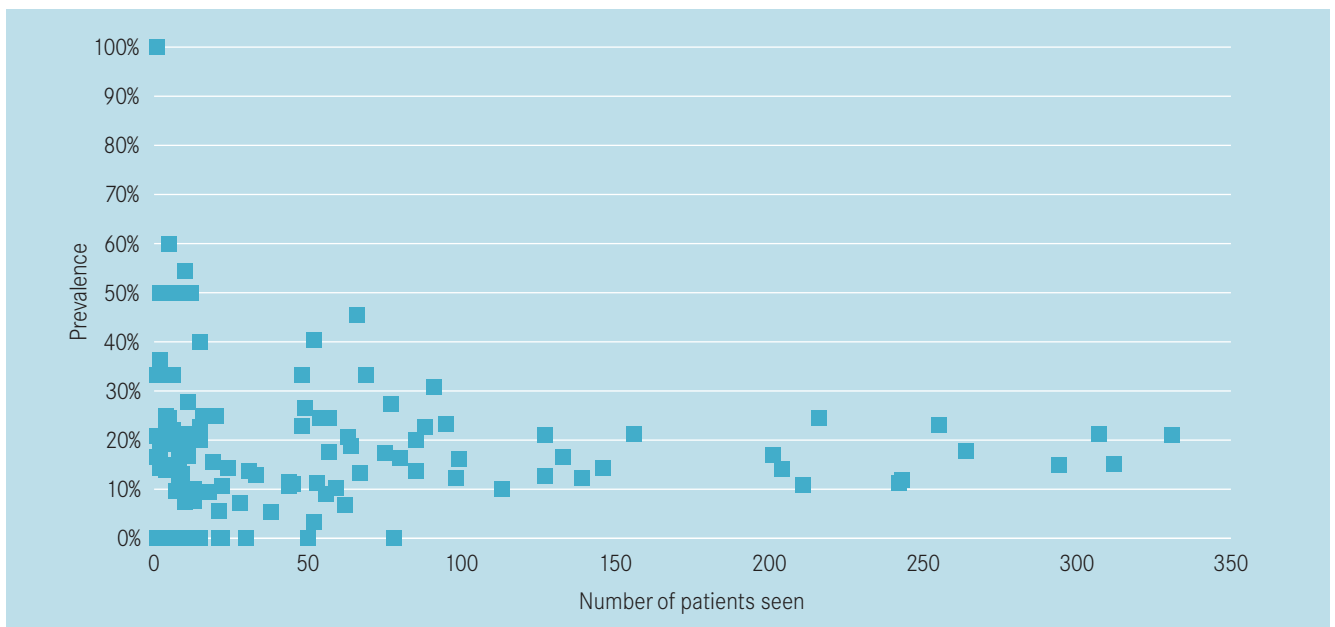


Figure 2b shows prevalence by the number of patients seen with each data point representing a single health service.

Figure 2c shows prevalence by the number of patients seen with each data point representing a single campus. This illustrates that the smaller the number of patients seen the larger the range of prevalence (i.e. small number of patients with pressure ulcers = large change in health service prevalence). Caution should be used interpreting state-wide data when the units of measurement (health service) vary so widely.

1.3 Pressure ulcer prevalence by DHS comparative groups

PUPPS 3

Figure 3 benchmarks the Department of Human Services (DHS) comparative groups (see Key below) and shows the changes from PUPPS 1 to PUPPS 2&3. Each comparative group value is represented by the mean of each group as described in Table 3a.

Groups A and D have a higher rate of patients with hospital acquired ulcers only 74.2% and 75.0% correspondingly. See Appendix D.

Comparison with PUPPS 1&2

Five comparative groups showed a consistent decrease in prevalence from PUPPS 1 to PUPPS 2 and to PUPPS 3. Two comparative groups (C, E&M) show an increase in prevalence from PUPPS 1 to PUPPS 2 (range 6.2% to 8.9%) and decrease from PUPPS 2 to PUPPS 3 (range 2.1% to 12.7%). Group C shows decrease from PUPPS 1 to PUPPS 3 (12.7%) and group E&M shows increase from PUPPS 1 to PUPPS 3 (6.8%).

In summary six comparative groups showed a decrease in prevalence from PUPPS 1 to PUPPS 3 (range 4.8% to 14.5%) and all seven groups showed decrease in prevalence from PUPPS 2 to PUPPS 3 (range 1.8% to 12.7%).

Key: DHS comparative groups

ID	Description	Criteria
A1	Teaching hospitals—large	
A2	Teaching hospitals—other	
B	Large regional base and suburban	
C	Regional general hospitals	1000–4000 separations per annum
D	Area hospitals	500–1000 separations per annum
E	Local hospitals	<500 separations per annum
Z	Ungrouped agencies (non-casemix funded)	Generally subacute facilities
M	Multi purpose services	

Figure 3. Change in pressure ulcer prevalence by DHS comparative group

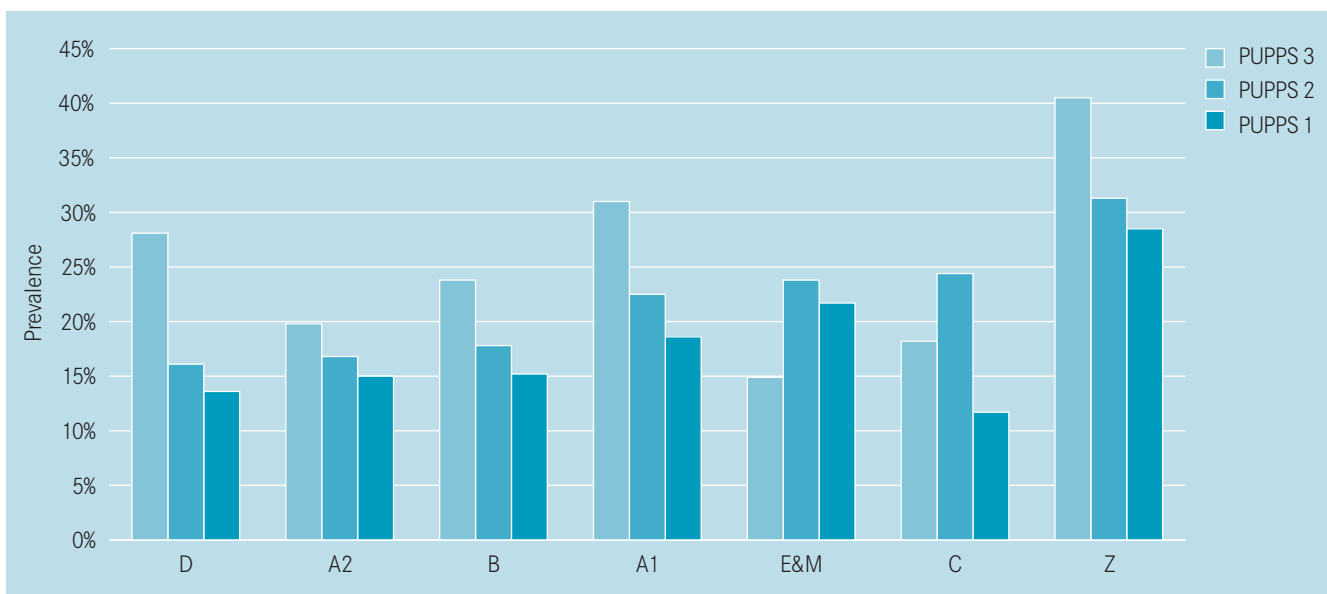


Table 3a. Pressure ulcer prevalence by DHS comparative group

DHS comparative group	Patients refused PUPPS 3 (%)		Patients seen PUPPS 3 (%)		Patients with ulcers	Prevalence PUPPS 3 %	95% CI of prevalence %
A1	361	(35.8)	1,961	(28.3)	365	18.6	16.9–20.3
A2	282	(28.0)	1,889	(27.2)	284	15.0	13.4–16.6
B	212	(21.0)	1,454	(21.0)	221	15.2	13.3–17.0
C	28	(2.8)	299	(4.3)	35	11.7	8.1–15.3
D	22	(2.2)	352	(5.1)	48	13.6	10.0–17.2
E&M	10	(1.0)	157	(2.3)	34	21.7	15.2–28.1
Z	93	(9.2)	824	(11.9)	235	28.5	25.4–31.6
Total	1,008	(100)	6,936	(100)	1,222	17.6	

Table 3b. Change in pressure ulcer prevalence by DHS comparative group

DHS Comparative group	% prevalence PUPPS 1 [Total patients seen]	% prevalence PUPPS 2 [Total patients seen]	% prevalence PUPPS 3 [Total patients seen]	Change % PUPPS 1 to PUPPS 3 [p value]	Change % PUPPS 2 to PUPPS 3 [p value]	95% CI for change % PUPPS 1 to PUPPS 3 [PUPPS 2 to PUPPS 3]	
A1	31.0 [1,379]	22.5 [1,808]	18.6 [1,961]	-12.4 [0.000]	-3.9 [0.003]	-15.4 [-6.5]	-9.4 [-1.3]
A2	19.8 [1,250]	16.8 [1,777]	15.0 [1,889]	-4.8 [0.000]	-1.8 [0.136]	-7.5 [-4.2]	-2.1 [0.6]
B	23.8 [1,308]	17.8 [1,452]	15.2 [1,454]	-8.6 [0.000]	-2.6 [0.059]	-11.6 [-5.3]	-5.6 [0.1]
C	18.2 [313]	24.4 [308]	11.7 [299]	-6.5 [0.024]	-12.7 [0.000]	-12.1 [-18.7]	-0.9 [-6.7]
D	28.1 [228]	16.1 [336]	13.6 [352]	-14.5 [0.000]	-2.5 [0.356]	-21.3 [-7.8]	-7.6 [2.8]
E&M	14.9 [47]	23.8 [168]	21.7 [157]	6.8 [0.308]	-2.1 [0.652]	-5.2 [-11.2]	18.8 [7.0]
Z	40.5 [625]	31.3 [792]	28.5 [824]	-12 [0.000]	-2.8 [0.219]	-16.9 [-7.3]	-7.1 [1.7]

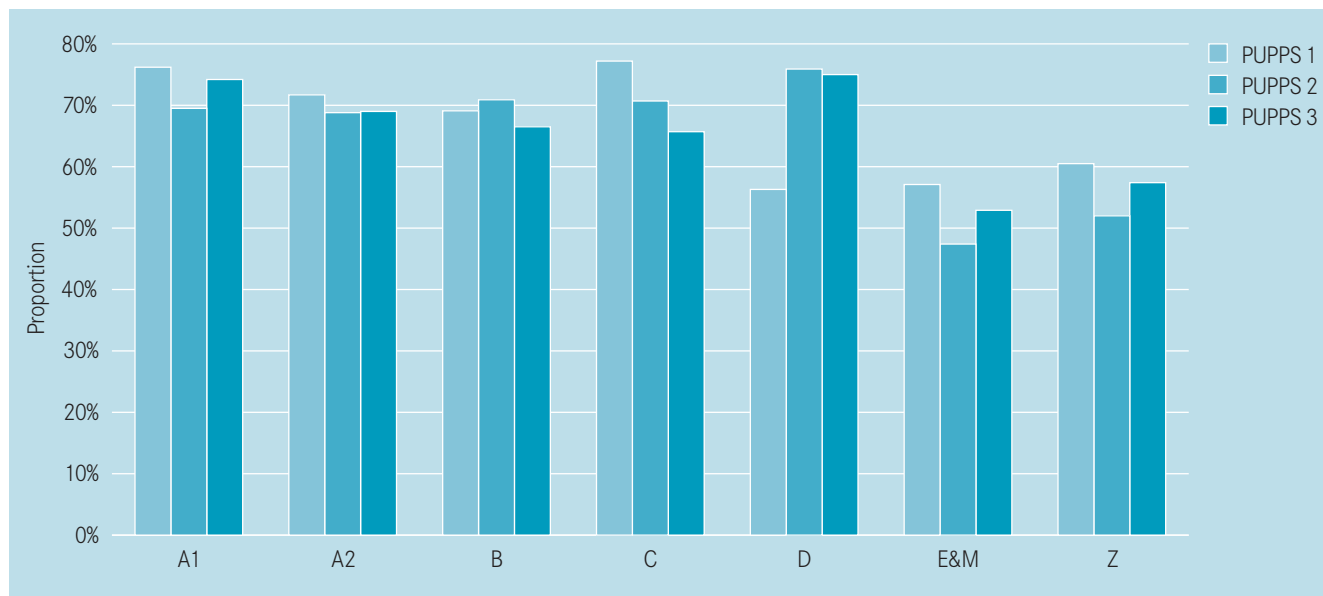
Outlined in Table 3a is the prevalence by comparative group for PUPPS 3.

Table 3b shows the comparative group prevalence for PUPPS 3 compared to PUPPS 1&2.

Group C shows consistent decrease in prevalence of patients with hospital acquired ulcers (only) during the 3 surveys. Three groups (A1, E&M and Z) show a decrease from PUPPS 1 to PUPPS 2 (range 6.6% to 9.8%) and increase from PUPPS 2 to PUPPS 3 (range 4.7% to 5.6%). Four groups show higher than 60% hospital acquired ulcers (only) during all three surveys. Figure 4 shows the proportion of patients with hospital acquired ulcers (only) by DHS comparative group and the changes from PUPPS 1 to PUPPS 2&3.

These results need to be interpreted cautiously as there were either small changes in prevalence or a small number of patients. The overall statistical change between PUPPS 1 and PUPPS 3 was not significant.

Figure 4. Change in proportion of patients with hospital acquired ulcers (only) by DHS comparative group



1.4 Pressure ulcer prevalence by medical specialty

PUPPS 3

Figure 5, Tables 4a, 4b & 4c show pressure ulcer prevalence by medical specialty. The key below notes which specialties were included in each broad grouping. Data was missing for 16 patients, which accounted for 0.1% (n = 1) of all patients with ulcers.

“Critical Care” (87.5%) and “Surgical” (81.9%) medical specialties contained the highest proportion of patients with hospital acquired ulcers (only). See Appendix E (For PUPPS 1 and PUPPS 2—Critical care – 88.7%, 61.9% and Surgical – 85.8%, 73.5%)

Figure 5. Change in pressure ulcer prevalence by medical specialty

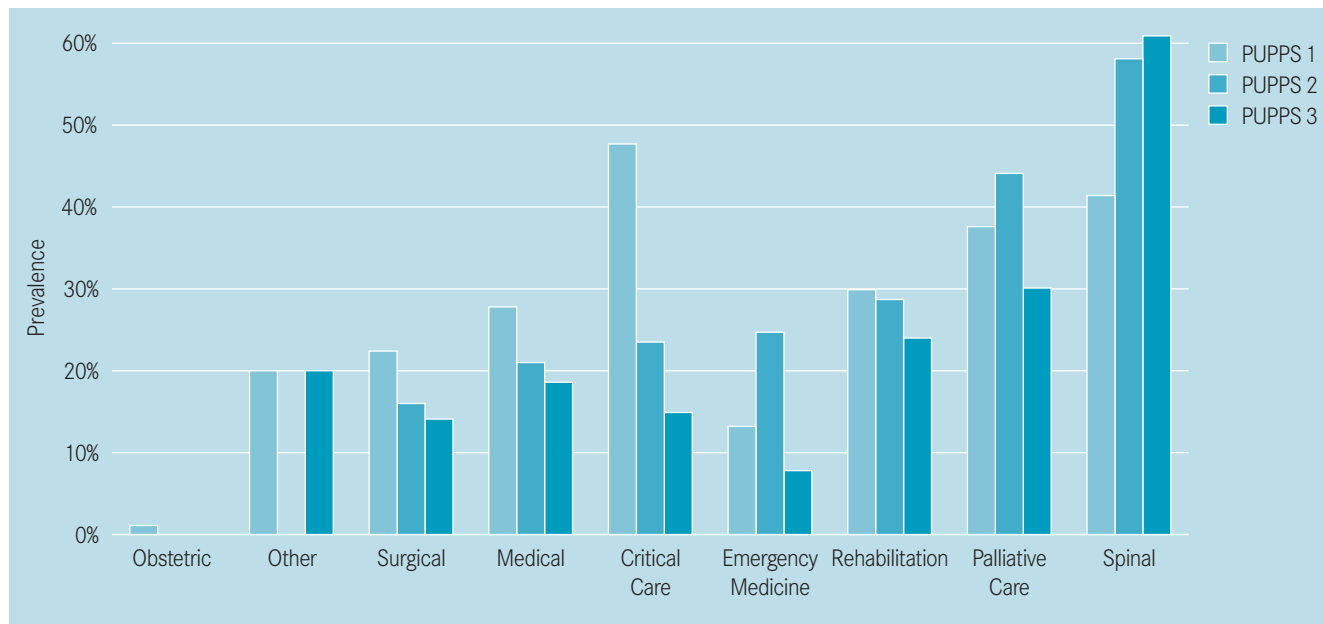


Table 4a. Pressure ulcer prevalence by medical specialty

Medical specialty	PUPPS 3 patients refused	PUPPS 3 patients consenting	PUPPS 3 patients with ulcers	PUPPS 3 % prevalence within specialty	95% CI of prevalence
Spinal	5	23	14	60.9	41.0%–80.9%
Palliative care	36	196	59	30.1	23.7%–36.5%
Rehabilitation	118	1,101	264	24.0	21.5%–26.5%
Medical	455	3,053	569	18.6	17.2%–20.0%
Critical care	56	483	72	14.9	11.7%–18.1%
Surgical	210	1,645	232	14.1	12.4%–15.8%
Emergency medicine	37	128	10	7.8	3.1%–12.4%
Obstetric	86	286	0	0	
Other	1	5	1	20.0	-15.1%– 55.1%
Missing data	4	16	1	6.25	-5.6%–18.1%
Total	1,008	6,936	1,222		

Table 4b. Change in pressure ulcer prevalence by medical specialty

Medical specialty	PUPPS 1 % prevalence within specialty	PUPPS 2 % prevalence within specialty	PUPPS 3 % prevalence within specialty	Change PUPPS 1 to PUPPS 3 [p value]	Change PUPPS 2 to PUPPS 3 [p value]*	95% CI of change PUPPS 1 to PUPPS 3 % [PUPPS 2 to PUPPS 3 %]*	
Spinal	41.4	58.1	60.9	19.5 [0.836]	2.8 [0.836]	-7.3 [-23.6]	46.3 [29.2]
Palliative care	37.6	44.1	30.1	-7.5 [0.004]	-14.0 [0.004]	-17.9 [-23.6]	2.9 [-4.4]
Rehabilitation	29.9	28.7	24.0	-4.7 [0.019]	-4.7 [0.019]	-10.4 [-8.6]	-1.4 [-0.8]
Medical	27.8	21.0	18.6	-9.2 [0.000]	-2.4 [0.016]	-11.4 [-4.3]	-7.0 [-0.4]
Critical care	47.7	23.5	14.9	-32.8 [0.000]	-8.6 [0.007]	-42.0 [-15.3]	-23.6 [-1.9]
Surgical	22.4	16.0	14.1	-8.3 [0.000]	-1.9 [0.136]	-11.1 [-4.4]	-5.5 [0.6]
Emergency medicine	13.2	24.7	7.8	-16.9 [0.001]	-16.9 [0.001]	-14.3 [-27.0]	3.5 [-6.8]
Obstetric	1.1	0.0	0.0	-1.1 [0.075]	0 [—]	-2.6	0.4
Other	20.0	0.0	20.0	0 [—]	20.0 [0.086]	[-15.1]	[55.1]
Missing data	53.8	22.0	6.25	-44.55	-15.75 [0.151]	[-31.6]	[0.1]

Analyses of change PUPPS 2 to PUPPS 3 based on PUPPS 2 reported data

Comparison with PUPPS 1&2

Six medical specialities recorded a decrease in pressure ulcer prevalence, with “Emergency medicine” demonstrating the greatest change, a decrease of 16.9 % from PUPPS 2 (24.7%, 95% CI 16.9% – 34.6%) to PUPPS 3 (7.8%, 95% CI 3.1% – 12.4%). Four of these medical specialities show a consistent decrease in pressure ulcer prevalence from PUPPS 1 to PUPPS 2 and PUPPS 3. Another two (“Emergency medicine” and “Palliative care”) previously showed increase in prevalence (PUPPS 1 to PUPPS 2), now show a decrease, not only compared to PUPPS 2 but also compared PUPPS 1.

One medical speciality (“Spinal”) shows a consistent increase in pressure ulcer prevalence from PUPPS 1 to PUPPS 2 and PUPPS 3. These results need to be interpreted cautiously as there were only very small numbers in the survey, the confidence interval is therefore very wide and overall statistical change between PUPPS 1 and PUPPS 3 was not significant. Of the 14 “Spinal” patients with ulcers 64.3% (n = 9) had ulcers present on admission. Patients with spinal injury are recognised as being at high risk of developing pressure ulcers and are frequently admitted to acute care for management of pressure ulcers²¹.

Table 4b shows the change in pressure ulcer prevalence between PUPPS 3 and PUPPS 1&2 for each medical speciality.

Table 4c demonstrates pressure ulcer prevalence by medical speciality as a proportion of the overall prevalence for PUPPS 3.

Table 4c. Pressure ulcer prevalence by population proportion by medical speciality

Medical speciality	PUPPS 1 % prevalence over total patients seen	PUPPS 2 % prevalence over total patients seen	PUPPS 3 % prevalence over total patients seen	Change from PUPPS 1 to PUPPS 3 [PUPPS 2 to PUPPS 3]		p value PUPPS 1 to PUPPS 3 [PUPPS 2 to PUPPS 3]	
Spinal	0.2	0.3	0.2	0	[-0.1]	1.0	[0.242]
Palliative care	1.0	1.2	0.8	-0.2	[-0.4]	0.246	[0.019]
Rehabilitation	3.4	3.7	3.8	0.4	[0.1]	0.245	[0.759]
Medical	15.2	10.7	8.2	-7	[-2.5]	0.000	[0.000]
Critical care	1.2	0.7	1.0	-0.2	[0.3]	0.294	[0.057]
Surgical	5.1	3.6	3.3	-1.8	[-0.3]	0.000	[0.338]
Emergency medicine	0.2	0.3	0.1	-0.1	[-0.2]	0.150	[0.009]
Obstetric	0.1	0.0	0.0	-0.1	[0]	0.008	[—]
Other	0.1	0.0	0.0	-0.1	[0]	0.008	[—]
Missing data	0.1	0.2	0.0	-0.1	[-0.2]	0.008	[0.000]
	26.5	20.8	17.6				

Key: Medical specialty groups

Primary Medical Specialty	Group includes:
Critical care	Critical Care, Coronary Care, Level 2 Special Care Nurseries, High Dependency & Intensive Care Units (Adult and Neonatal).
Emergency medicine	Emergency Medicine
Medical	Cardiovascular/Cardiology, Dermatology, Detoxification, Endocrinology, Gastroenterology, General Medical, Geriatric Medicine, Haematology, Hepatobiliary, Immunology, Infectious Diseases, Interim Care, Neonatal, Neurology, Oncology, Paediatric (medical or surgical as appropriate), Renal, Respiratory Medicine, Rheumatology, Stroke, Special Care Nursery
Surgical	Burns, Cardiovascular/Cardiology, Ear Nose & Throat, General Surgical, Gynaecology, Head and neck, Liver transplant, Neurosurgical, Ophthalmology, Oral facio-maxillary, Orthopaedic, Pain Management, Plastic Surgery, Thoracic Surgery, Transplant, Urological & Vascular.
Obstetric	Obstetric
Palliative care	Palliative Care
Rehabilitation	Rehabilitation
Spinal	Spinal
Other	All other medical specialties

Paediatric patients were allocated to their appropriate medical speciality and were not considered a separate group for the medical speciality analysis.

1.5 Distribution of pressure ulcers per patient

PUPPS 3

The survey identified 1,222 patients with ulcers. Patients with more than 1 ulcer accounted for 43.7% (n = 534) of all patients with ulcers, and 40.3% (n = 215) of those had more than 2 ulcers. In the PUPPS 3 population 1 patient had 11 ulcers, as per Figure 6 and Table 5 below.

Figure 6. Change in distribution of pressure ulcers per patient

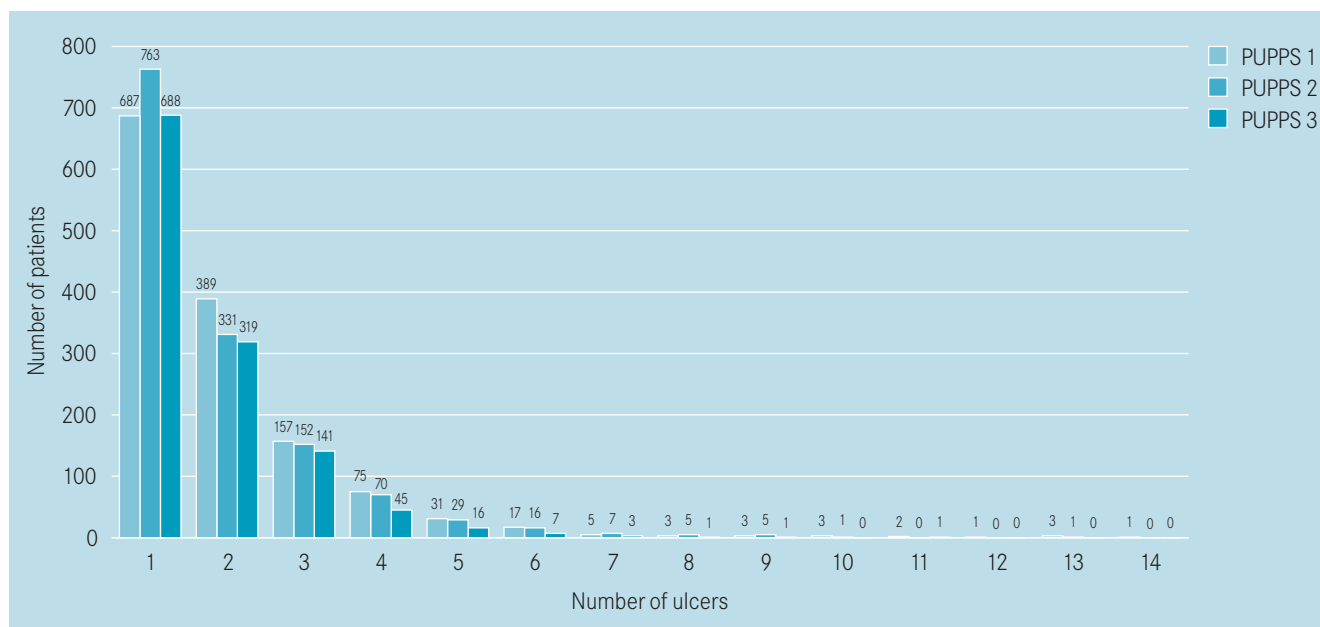


Table 5. Distribution of pressure ulcers per patient

Number of pressure ulcers per patient	Number of patients with pressure ulcers	Number of pressure ulcers	% of all patients with pressure ulcers
1	688	688	56.3
2	319	638	26.1
3	141	423	11.5
4	45	180	3.7
5	16	80	1.3
6	7	42	0.6
7	3	21	0.2
8	1	8	0.1
9	1	9	0.1
10	0	0	-
11	1	11	0.1
Total	1,222	2,100	100.0

Comparison with PUPPS 1&2

Compared to PUPPS 1 there are the same number of people with only one ulcer and fewer with multiple ulcers. The distribution of pressure ulcers per patient represents a decrease of 6.2% in the number of patients with more than one ulcer.

Compared to PUPPS 2 there is a decrease in the number of people in all categories. The distribution of pressure ulcers per patient represents a decrease of 1.2% in the number of patients with more than one ulcer.

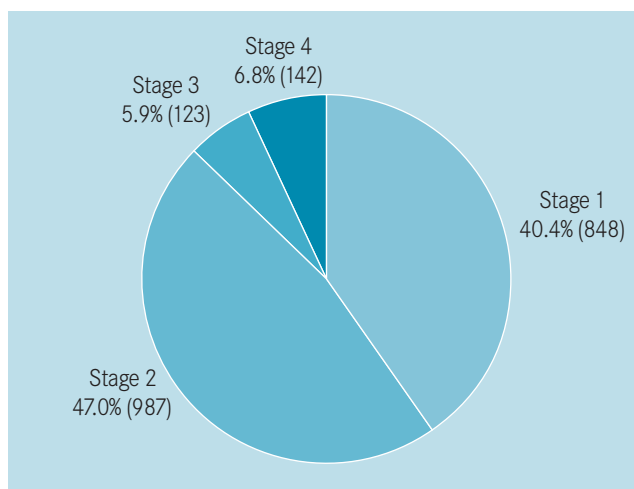
1.6 Pressure ulcers by stage

Pressure ulcers by stage

PUPPS 3

In total, 2,100 pressure ulcers were found in this survey on 1,222 patients. Stage 1 and Stage 2 pressure ulcers comprised 87.4% (n = 1,835) of these ulcers. Pressure ulcers classified as Stages 3 and 4 represented 12.6% (n = 265) of ulcers found (refer to definitions of pressure ulcer staging Appendix A). Figure 7 shows the percentage and number of each stage of ulcer.

Figure 7. Pressure ulcers by stage



Comparison with PUPPS 1&2

Table 6 summarizes the pressure ulcers by stage for PUPPS 3 and shows the changes from PUPPS 1 to PUPPS 2&3. The proportion of Stage 1 ulcers increased and the proportion of the remaining ulcers decreased (in comparison to PUPPS 2).

Table 6. Change in pressure ulcers by stage

Pressure ulcer stage	% (ulcers) of all pressure ulcers PUPPS 1	% (ulcers) of all pressure ulcers PUPPS 2	% (ulcers) of all pressure ulcers PUPPS 3	Change in % of all pressure ulcers PUPPS 1 to PUPPS 3 [PUPPS 2 to PUPPS 3]	p value PUPPS 1 to PUPPS 3 [PUPPS 2 to PUPPS 3]
1	43.1 (1,153)	37.3 (955)	40.4 (848)	-2.7 [3.1]	0.061 [0.031]
2	44.2 (1,183)	47.8 (1,224)	47.0 (987)	2.8 [-0.8]	0.054 [0.587]
3	4.5 (120)	6.4 (165)	5.9 (123)	1.4 [-0.5]	0.029 [0.481]
4	8.2 (220)	8.4 (215)	6.8 (142)	-1.4 [-1.6]	0.070 [0.041]
Total	100.0 (2,676)	100.0 (2,559)	100.0 (2,100)		

1.7 Hospital acquired ulcers

Pressure ulcers were defined as being hospital acquired if there was no documentation referring to the presence of a pressure ulcer within the first 24 hours of admission.

PUPPS 3

Of the patients with pressure ulcers, 67.6% (n = 826) acquired all the pressure ulcers in hospital, whereas 24.5% of patients (n = 300) had all the pressure ulcers identified on admission. Patients who had at least one pressure ulcer on admission and acquired additional pressure ulcers during their hospital stay accounted for 7.0% (n = 85). Data was missing for 0.9% of patients (n=11). See Figure 8.

Of the 385 patients who had a pressure ulcer on admission, 85 (22.1%) developed a combined total of 124 additional pressure ulcers during their admission. 59 developed 1 additional pressure ulcer (69.4%), and 26 patients developed more than 1 (30.6%). The maximum number of additional pressure ulcers developed by patients is 4. Four patients had pressure ulcers noted on admission, which resolved during the admission period prior to survey day.

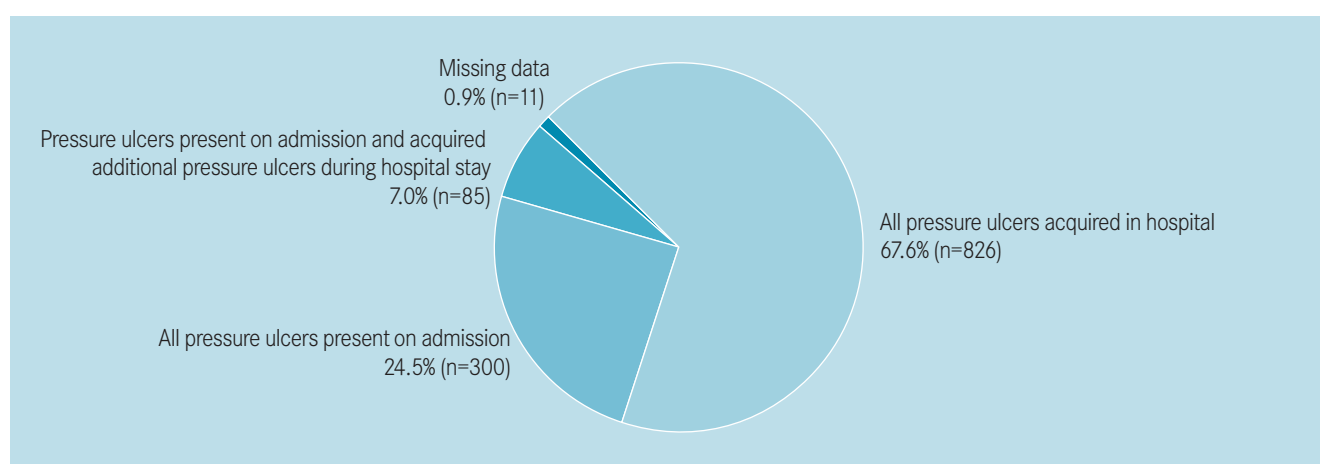
Comparison with PUPPS 1&2

This result represents an increase of 1.5% compared to the PUPPS 2 result of 66.2% hospital acquired pressure ulcers and is similar to the PUPPS 1 result of 67.6%.

As in PUPPS 2, PUPPS 3 patients who had a pressure ulcer on admission had greater numbers of Stage 3 and Stage 4 pressure ulcers.

More detailed information about distribution of hospital acquired ulcers by health service is shown in Appendix F.

Figure 8. Source of pressure ulcers



1.8 Anatomical distribution of pressure ulcers

PUPPS 3

Graphic 1 represents the percentage and number of pressure ulcers found at each anatomical location for the 2,100 pressure ulcers found on 1,222 patients. The following locations accounted for 70.7% (n = 1,484) of the ulcers found: heel (25.2%, n = 529 ulcers), sacrum/coccyx (24.8%, n = 521), toes (10.6%, n = 223) and ischium/buttocks (10.0%, n = 211). Utilising broader anatomical groupings the lower limb accounts for 47.2% (n = 992) and pelvic girdle for 36.3% (n = 762) of all ulcers found.

For Figure 1 all remaining locations accounted for 9.8% of pressure ulcers (n = 206).

- Denotes two highest frequency sites
- Denotes broad category prevalence

Comparison with PUPPS 1&2

As with PUPPS 1 and PUPPS 2, the sacrum/coccyx and heel remain the most common sites for the development of pressure ulcers.

Table 7 represents the percentage and number of pressure ulcers found at each anatomical location for the 2,100 pressure ulcers found in 1,222 patients and the change in percentage from PUPPS 1 to PUPPS 2&3.

PUPPS 3 did not use the anatomical locations ‘fingers’ or ‘leg’ and combined ‘medial’ and ‘lateral malleolus’.

Note: The “% of patients with ulcers” column does not sum to 100 as patients may have ulcers at multiple sites.

Graphic 1. Anatomical distribution of pressure ulcers

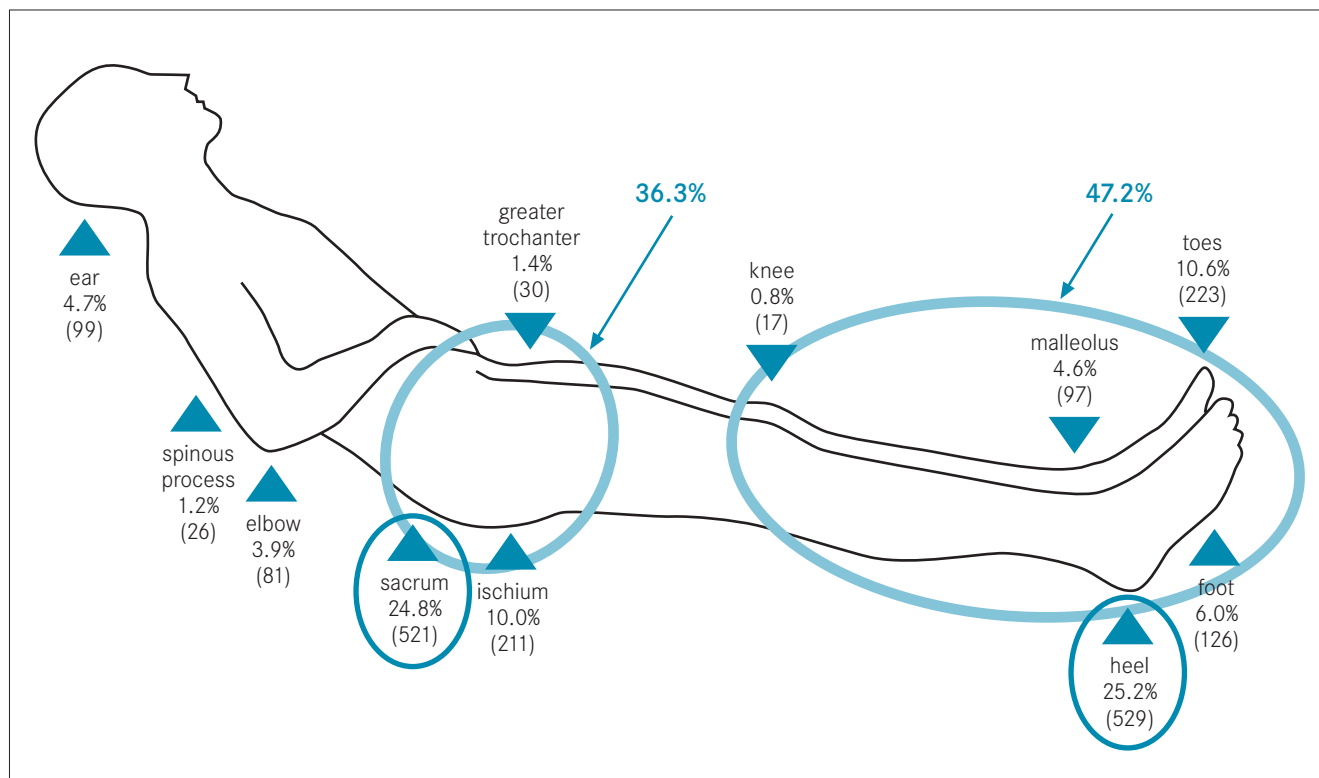


Table 7. Change in anatomical distribution of pressure ulcers

Anatomical location	PUPPS 3 number of ulcers at this location (% of all ulcers observed)		PUPPS 3 number of patients with ulcer at this location (%)		Change in % of all ulcers observed PUPPS 1 to PUPPS 3 [PUPPS 2 to PUPPS 3]	
Heel	529	(25.2%)	407	(33.3%)	2.4	[5.0]
Sacrum/Coccyx	521	(24.8%)	455	(37.2%)	4.4	[3.1]
Toes	223	(10.6%)	156	(12.8%)	-2.4	[-2.9]
Ischium/Buttocks	211	(10.0%)	145	(11.9%)	0.4	[0]
Foot	126	(6.0%)	90	(7.4%)	1.8	[-0.4]
Ear	99	(4.7%)	78	(6.4%)	-0.2	[0.2]
Malleolus	97	(4.6%)	83	(6.8%)	-1	[-0.8]
Elbow	81	(3.9%)	69	(5.6%)	-1.4	[-2.2]
Greater trochanter	30	(1.4%)	24	(2.0%)	0	[0.2]
Spinous process	26	(1.2%)	23	(1.9%)	-0.7	[-0.4]
Nose	23	(1.1%)	22	(1.8%)	0.2	[0.5]
Knee	17	(0.8%)	14	(1.1%)	0.4	[0.1]
Scapula	16	(0.8%)	13	(1.1%)	0.2	[-0.1]
Iliac crest	15	(0.7%)	12	(1.0%)	0.4	[0.3]
Occiput	7	(0.3%)	5	(0.4%)	0.2	[-0.1]
Chin	2	(0.1%)	2	(0.2%)	0	[-0.1]
All Other Locations	77	(3.7%)	58	(4.7%)	3.5	[0.5]
Total	2,100	(100%)				

1.9 Pressure ulcer prevalence by demographic and clinical variables

PUPPS 3

Tables 8a and 8b detail the relationship between various clinical and demographic variables and the presence of a pressure ulcer. The number of variables used in PUPPS 1&2 was reduced for PUPPS 3 based on an assessment of their practical value in relation to the trends and relationships identified through PUPPS 1&2.

PUPPS 3 data suggests patients with a pressure ulcer are more likely to be older, female, and unable to independently reposition themselves.

The number of observations for each comparison depends on the number of “non missing” observations for the outcome (ulcer versus no ulcer) and the predictor (age, gender etc.). However, if any of these patients have missing values for the predictor, then the number of observations that can be made for this comparison reduce accordingly.

The relationship between presence of ulcer and predictors of outcomes (gender, risk assessment performed and ability to independently reposition) was assessed using Pearson Chi Square tests. A Wilcoxon rank sum test was used to determine if patients with an ulcer had a different age to those who did not.

Table 8a. Pressure ulcer prevalence by demographic variables

Variable	Patients consenting	Patients with ulcer	Prevalence %	p value
Age				<0.001
< 42 days	250	9	3.6	
43 days to <1yr	57	4	7.0	
1–4 yrs	35	3	8.6	
5–9 yrs	33	1	3.0	
10–17 yrs	127	11	8.7	
18–19 yrs	59	2	3.4	
20–29 yrs	326	11	3.4	
30–39 yrs	388	26	6.7	
40–49 yrs	486	63	13.0	
50–59 yrs	659	102	15.5	
60–69 yrs	930	154	16.6	
70–79 yrs	1,523	307	20.2	
80–89 yrs	1,590	388	24.4	
90 + yrs	460	139	30.2	
Unknown	13	2	15.4	
Gender				0.137
Male	3,175	583	18.4	
Female	3,667	631	17.2	
Unknown	94	8	8.5	

Comparison with PUPPS 1&2

These patient demographic and clinical variables are similar to PUPPS 2 with the exception of gender.

Pressure ulcer prevalence by age group for the total population is detailed in Figure 9a below. Patients 60 years of age and over, represented 80.8% (n = 988) of those identified with a pressure ulcer.

Figure 9b shows the prevalence within the paediatric age group, i.e. less than 18 years of age. The prevalence for paediatric patients as a subgroup is 5.6%. Paediatric patients accounted for 7.2% (n = 502) of the survey population, and accounted for 2.3% (n = 28) of all patients with pressure ulcers.

Figure 9a. Prevalence by age group

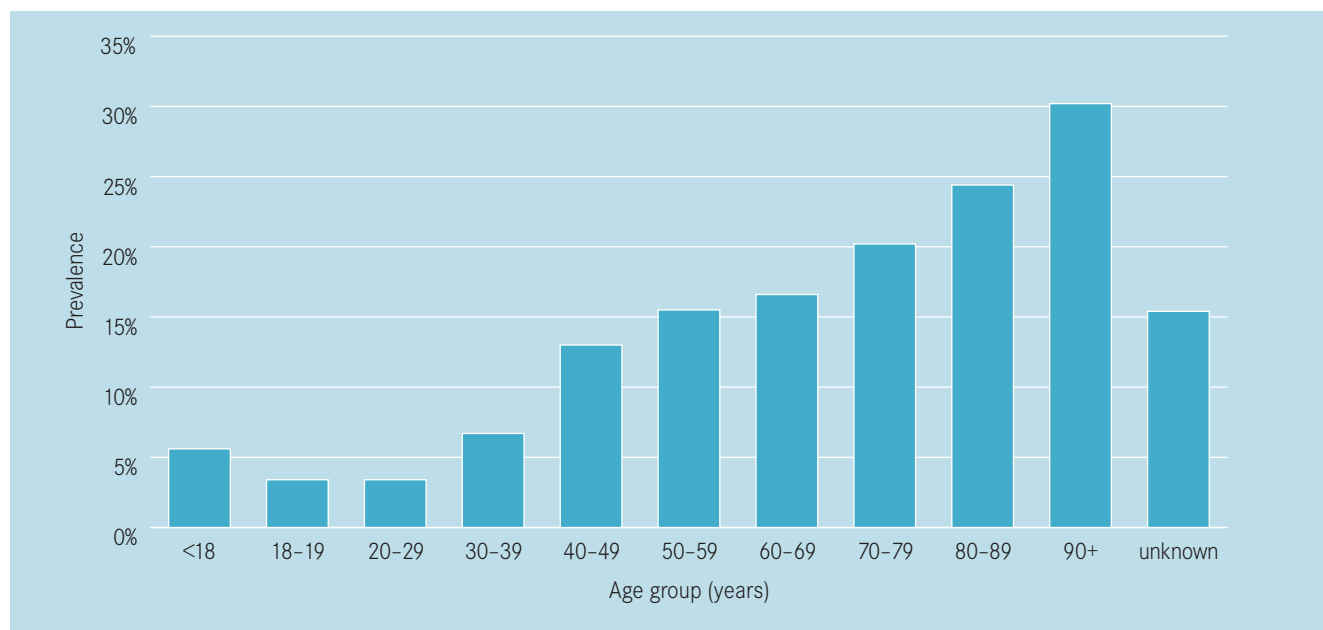


Figure 9b. Prevalence by paediatric age group

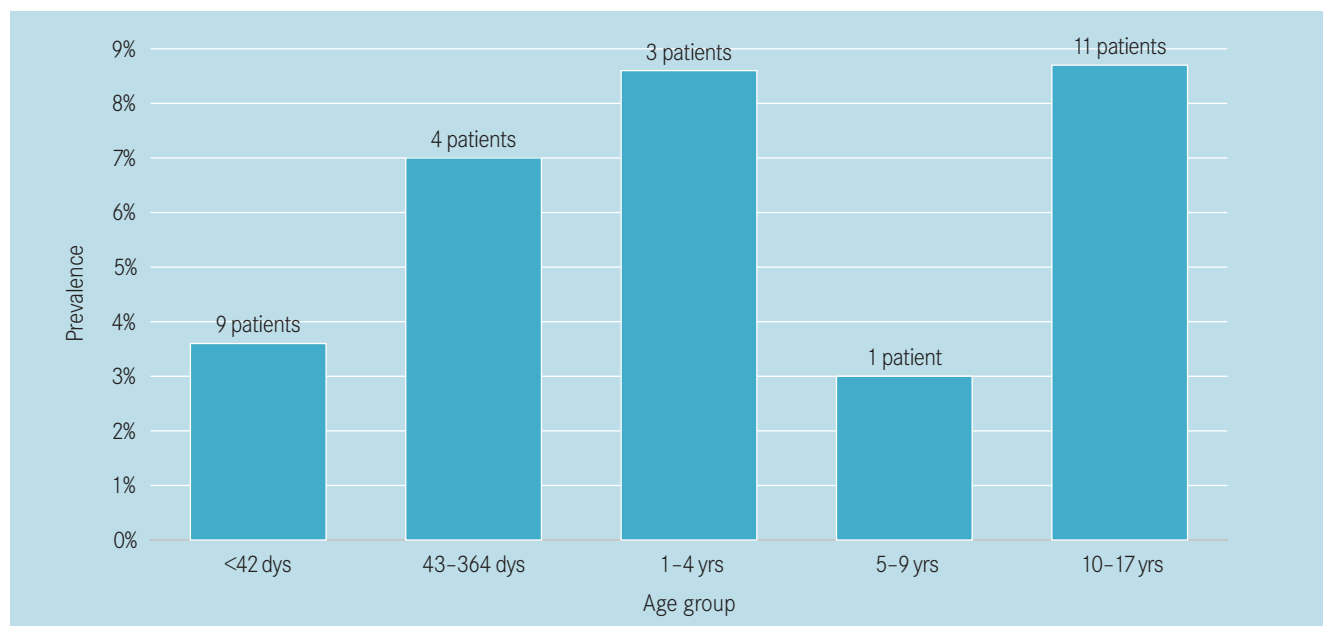


Table 8b. Pressure ulcer prevalence by clinical variables

Variable	Patients consenting	Patients with ulcer	Prevalence %	p value
Risk assessment				<0.001
Done	5,241	920	17.6	
Not done	2,682	301	11.2	
Independent repositioning				<0.001
Able	5,422	704	13.0	
Unable	1,468	503	34.3	

Independent repositioning

The prevalence of ulcers was 2.6 times higher in patients unable to independently reposition, than in those able to independently reposition. Of all 1,222 patients with ulcers, 704 (57.6%) were able to reposition, and 503 (41.2%) were unable to reposition (Table 8b). In both cases (i.e. those able to and those unable to reposition), more than 70% of patients with ulcers had hospital acquired ulcers.

Nearly 3/4 of patients (73.2%) who were unable to reposition had a device in situ. This is a higher proportion than in those able to reposition themselves (63.6%).

Of 503 patients with ulcers and unable to reposition 66 (13.1%) did not have a device in situ.

In patients unable to reposition, 56.1% were assessed as no, low or medium risk, compared to 89.9% of those able to reposition. The results suggest there is awareness of the risk of being unable to reposition. Of patients unable to reposition and who were assessed as having none, low or medium risk, nearly forty percent (38.5%) did in fact have ulcers. In contrast in those able to reposition and who were assessed as none, low, medium risk, only 12.3% had ulcers. This suggests that the sensitivity of current risk assessment tools is poor or that additional training for risk assessment is required.

Of 3,056 patients categorised in the “Medical” group 569 had ulcers. Of those, 329 (57.8%) had been able to reposition and 232 (40.8%) unable. It’s important to add that of 232 patients unable to reposition 180 (77.6%) had hospital acquired ulcers; of 329 patients able to reposition 26 (7.9%) had hospital acquired ulcers. In patients unable to reposition, and in the ‘Medical’ group, in those who have ulcers nearly 80% were acquired in hospital compared to 7.9% in those who are able to reposition. This suggests that in ‘Medical’ specialty wards/units there could be a focus on awareness of risk assessment and preventive strategies put in place to reduce the number of hospital acquired ulcers.

2. Pressure ulcer risk assessment

2.1 Frequency of assessment

PUPPS 3

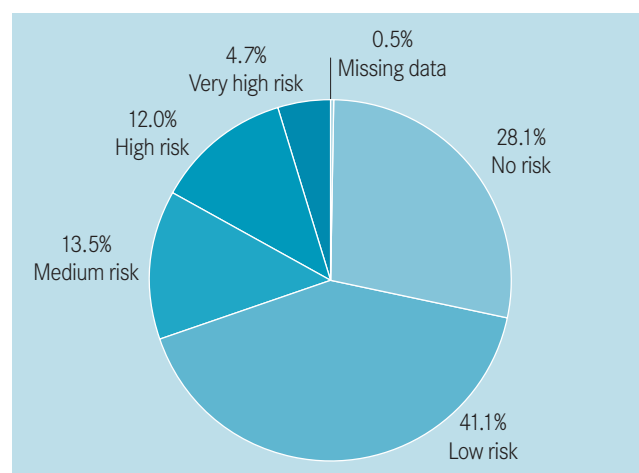
Almost two thirds of the surveyed population (66.0%, n = 5,241) had evidence of a pressure ulcer risk assessment being performed. Figure 10 and Table 9 show the proportion of each risk class (level of risk) in the patients who had a pressure ulcer risk assessment identified.

Comparison with PUPPS 1&2

This is an increase of 13.2% from PUPPS 2 ($p = 0.000$). The tool used was again spread between three internationally recognised and validated tools (Braden, Waterlow and Norton^{13,16}) and in-house tools. The recorded risk was medium to very high in 30.7% (n = 1,611) of the population with 69.3% (n = 3,360) assessed as having low or no risk. Risk class data was missing or not recorded for 0.5% (n = 28) of the risk assessments performed.

6,931 patients had non-missing data for 'presence of ulcer' (Yes/No) and 'risk assessment done' (Yes/No).

Figure 10. Proportion of risk class in risk assessed population



Risk assessment was much more likely in patients with ulcers identified. Of the 1,221 patients with ulcers, 920 (75.3%) had evidence of a risk assessment. Of the 5,709 patients without ulcers, 3,783 (66.3%) had evidence of risk assessment (Risk difference = 9.1%, $p < 0.001$).

Table 9. Pressure ulcer risk assessment

	Number of patients	Proportion
Risk assessment performed	5,241	66.0% of the cohort#
Tool used		
		% of those with a risk assessment
• Validated Tool	3,889	74.2
• Other tool (includes in-house)	1,329	25.4
• Not stated	23	0.4
Total	5,241	100.0
Risk class		
		% of those with this risk class score
• No risk	1,474	28.1
• Low	2,156	41.1
• Medium	705	13.5
• High	630	12.0
• Very high	248	4.7
• Missing data	28	0.5
Total	5,213 (99.5%) class reported	100.0

This is for the full cohort including refusals, where it is known if an assessment was done (n = 7,944).

2.2 Risk assessment and pressure reducing/relieving devices

PUPPS 3

PUPPS 3 results indicate that the higher the level of risk assessed on the screening tool, the more likely that a pressure reducing/relieving device was found insitu (see Table 10). This may indicate that patients who had a pressure ulcer risk assessment completed had been subjectively deemed to be at higher risk than other patients, or that hospital sites where assessment was regularly performed were also more likely to regularly use pressure reducing/relieving devices in their prevention strategies.

Risk assessment was much more likely in patients using a device. Of the patients with a device insitu, 3,250 out of 4,473 patients (72.7%) had evidence of a risk assessment. Of the 2,366 patients without a device, 1,393 (58.9%) had evidence of risk assessment (Risk difference = 13.8%, $p < 0.001$).

Comparison PUPPS 1&2

Across the total population there was a 23.7% increase in patients with a pressure relieving/reducing device insitu from PUPPS 2 to PUPPS 3.

PUPPS 3

Table 11 details information on risk assessment, presence of a pressure reducing/relieving device and the presence of a pressure ulcer for PUPPS 3.

Of the patients assessed as “no risk or low risk” of developing a pressure ulcer, 423 had a pressure ulcer (prevalence of 13.0%). Of patients who did not have a documented risk assessment, 55.7% had devices insitu, which may indicate some form of clinical judgment had been used to identify the patients’ needs for devices.

Of those patients with pressure ulcers 77.2% ($n = 944$) had a pressure relieving device insitu.

For 773 of the PUPPS 3 patients assessed in the “high or very high risk” category 122 (15.8%) had no device insitu yet 33 (4.3%) of these patients had at least one pressure ulcer.

Table 10. Risk assessment and pressure reducing /relieving devices

Risk class	No of patients	No of patients with pressure reducing/relieving device insitu	% patients with pressure reducing/relieving device insitu
Risk assessment performed			
No risk	1,314	852	64.5
Low	1,973	1,302	64.9
Medium	627	483	75.4
High	558	466	81.5
Very high	211	185	86.3
Missing data (assessment done, but no class recorded)	20	12	60.0
Total risk assessment performed	4,703	3,300	70.2
No risk assessment performed	2,227	1,261	54.9
Missing data	6	5	83.3
Total all patients	6,936#	4,566	

For 91 patients (24 of them with ulcers) who consented to a skin inspection, the presence or absence of a pressure reducing/relieving device was not recorded; however the information about the pressure reducing/relieving device (ID, type) was provided. Therefore these patients are included in this table.

Table 11. Risk assessment, devices and pressure ulcers

Risk class	Total	Devices insitu			No devices insitu		
		Patients with device	Patients with ulcer	Prevalence PUPPS 3 (PUPPS 1, PUPPS 2)	Patients with no device	Patients with ulcer	Prevalence PUPPS 3 (PUPPS 1, PUPPS 2)
No risk	1,307	852	64	7.5 (19.6, 15.5)	455	31	6.8 (9.9, 9.6)
Low	1,970	1302	217	16.7 (22.7, 27.0)	668	111	16.6 (16.3, 15.5)
Medium	623	483	155	32.1 (38.7, 37.1)	140	29	20.7 (22.1, 30.1)
High	561	466	173	37.1 (47.6, 46.3)	95	24	25.3 (37.3, 30.2)
Very high	212	185	97	52.4 (54.9, 55.4)	27	9	33.3 (27.8, 39.5)
Not recorded	20	12	3	25.0 (44.9, 35.0)	8	2	25.0 (26.8, 12.8)
No assessment	2,234	1,261	234	18.6 (34.3, 25.9)	973	66	6.8 (18.8, 12.0)
Missing data	9	8	1	12.5 (54.5, 22.2)	1	0	0 (25.0, 16.2)
Totals	6,936#	4,569	944		2,367	272	

For 91 patients (24 of them with ulcers) who consented to a skin inspection (n=6,936), the presence or absence of a pressure reducing/relieving device was not recorded; however the information about the pressure reducing/relieving device (ID, type) was provided. Therefore these patients are included in this table.

Comparison with PUPPS 1&2

From PUPPS 2 to PUPPS 3 there is an increase of 17.6% in the number of patients with pressure ulcers who had a pressure relieving device insitu.

Similar to PUPPS 2, there is an increase in the rates of pressure ulcers in patients who have higher risk screening scores for patients in the both the “devices insitu” and “no devices insitu” group.

3. Devices

3.1 Pressure reducing/relieving devices

PUPPS 3

No devices were in place for 272 patients (22.3%) who had ulcers including 30 (2.4%) who had either a Stage 3 or a Stage 4 as their highest stage of pressure ulcer (see Table 12). Data was not collected on the appropriateness of devices relative to the risk or stage of pressure ulcer found. Some patients had more than one type of device in situ.

It was found that many patients had either a combination of “Specialty bed” and “Replacement mattresses dynamic” or “Comfort/ adjunct” and “Replacement mattresses static”.

All health services were funded to replace a minimum of approximately 50–60% of their standard mattresses with static pressure reduction foam mattresses (categorised as ‘replacement mattress static’) as part of a DHS state-wide mattress replacement program in 2005.

Comparison PUPPS 1&2

There is a 22.3% increase from PUPPS 2 in the proportion of patients with a device insitu.

Table 12. Pressure reducing/relieving devices

Number of patients with device in situ (%)		Number of patients (%) with Highest Stage of pressure ulcers				
Device		Stage 1 (%)	Stage 2 (%)	Stage 3 (%)	Stage 4 (%)	Total (%)
Comfort/adjunct	833 (18.2%)	73 (27.0%)	148 (54.8%)	17 (6.3%)	32 (11.8%)	270 (100.0%)
Cushions & overlays static	573 (12.5%)	47 (28.0%)	93 (55.4%)	11 (6.5%)	17 (10.1%)	168 (100.0%)
Cushions & overlays dynamic	174 (3.8%)	17 (21.0%)	41 (50.6%)	8 (9.9%)	15 (18.5%)	81 (100.0%)
Replacement mattresses static	3,502 (76.7%)	203 (36.8%)	273 (49.5%)	36 (6.5%)	39 (7.1%)	551 (100.0%)
Replacement mattresses dynamic	515 (11.3%)	61 (29.5%)	123 (49.4%)	26 (10.4%)	39 (15.7%)	249 (100.0%)
Specialty beds	469 (10.3%)	39 (33.9%)	54 (47.0%)	10 (8.7%)	12 (10.4%)	115 (100.0%)
Total patients with at least one device insitu	4,566 (65.8%)	303 (32.1%)	469 (49.7%)	75 (7.9%)	97 (10.3%)	944 (100.0%)
Number of patients with no device insitu (%)	2,367 (34.13%)	106 (39.0%)	136 (50.0%)	15 (5.5%)	15 (5.5%)	272 (100.0%)
Missing data	3 (0.04%)	5 (83.3%)	1 (16.7%)	0 (–)	0 (–)	6 (100.0%)
Total	6,936 (100.0%)	414	606	90	112	1,222 (100.0%)

4. Documentation of pressure ulcer management

In order to determine if there was documentation related to the progress or management of pressure ulcers identified in the survey population, an audit of the medical record of patients with pressure ulcers was completed.

Documentation was deemed to have been identified if written notation regarding any of the ulcers identified was found in any part of the medical record on the survey day or the 4 days prior. This documentation could be noted in general medical progress notes, nursing care plans, clinical pathways and wound care charts.

PUPPS 3

Documentation related to the progress and management of pressure ulcers was found in 50.9% (n = 622) of patients. No documentation was found in 47.5% (n = 581) of patients and data was missing in 1.6% (n = 19) of cases. See Figure 11a below.

The higher the stage of ulcer, the higher the percentage of documentation for this patient group. See Figure 11b below.

It important to note that only 28.6% of patients with Stage 1 ulcers had documentation related to the progress and management of their pressure ulcers.

Comparison PUPPS 2

This result represents a small improvement in documentation of pressure ulcer management from the PUPPS 2 result where only 45.0% of patients were noted to have some documentation related to their pressure ulcer management. PUPPS 1 documentation was found in 90.7% of cases, which presented a significantly higher level than other published literature in this area. The high level of documentation recorded in PUPPS 1 was thought to have been associated with some degree of ‘Hawthorne’ effect given all health services had an extended period of prior knowledge of the survey.

The data did not identify if the documentation noted one, some or all of the ulcers identified on the patient on survey day.

Figure 11a. Change in documentation of pressure ulcer management

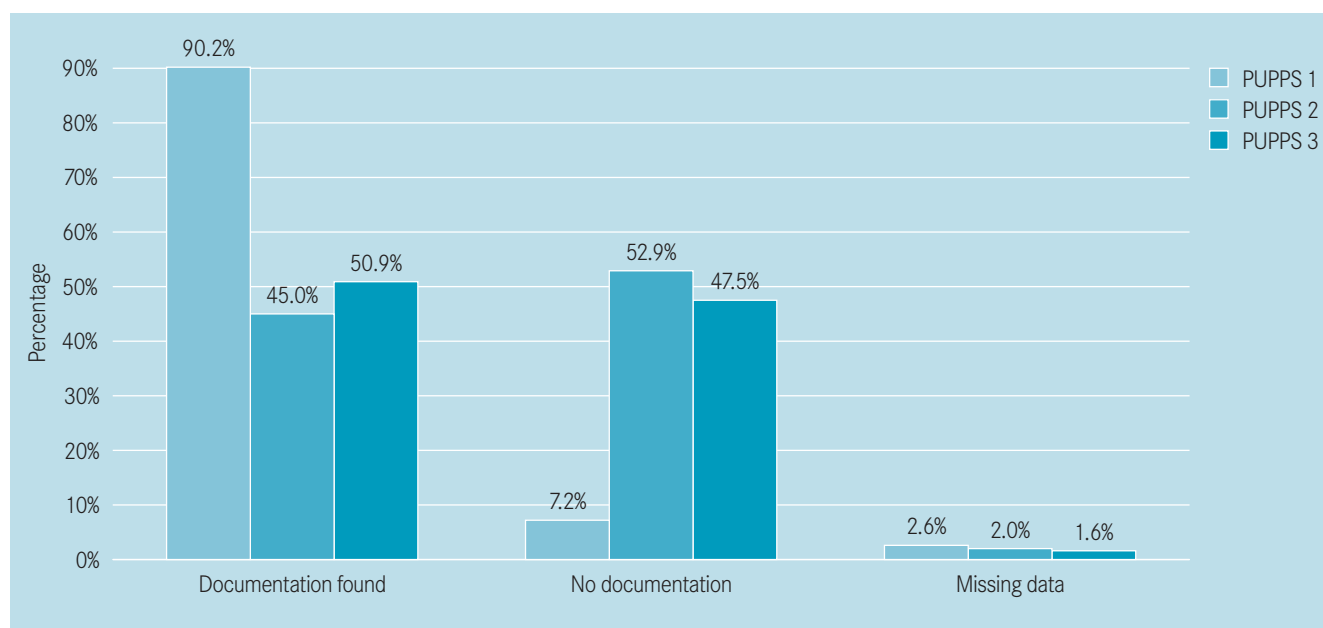


Figure 11b. Documentation of pressure ulcer management by highest stage of ulcer

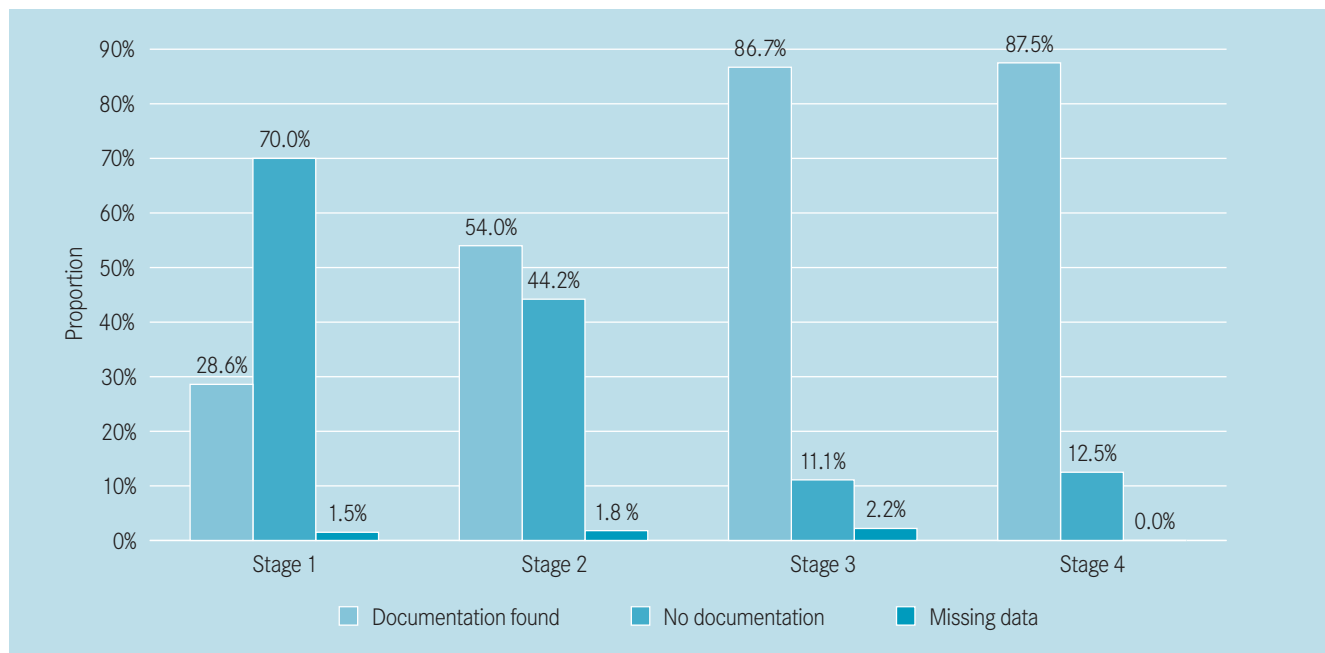


Figure 11 b shows the evidence of documentation related to pressure ulcer management for patients identified with ulcers in the PUPPS 3 population by highest stage of ulcer.

5. Demographic variables

5.1 Demographic variable frequency table

The relationship between refusal or acceptance of skin inspection and gender was assessed using Pearson Chi Square test. A Wilcoxon rank test was used to determine if the age of the group who refused was different to the group who accepted skin inspection. Due to the highly skewed distribution of time from admission to survey (TAS), a Mann-Whitney U test was performed.

PUPPS 3

Missing data from a range of variables for the patients who declined a skin inspection influences interpretation of differences between patients who consented and those who declined. Patients who declined were younger, and had a shorter time from admission to survey (TAS). See Table 13.

Comparison with PUPPS 2

The demographic variables of the group that declined a skin inspection are lower than in PUPPS 1&2 (except TAS, which is similar to TAS in PUPPS 1&2). In PUPPS 1&2 TAS was described in the demographic frequency table as Length of Stay (LOS).

Table 13. Demographic variables

Demographic variable	Patients consented (n = 6,936)	Patients missing data	Patients refused (n = 1,008)	Patients missing data	Total patients (n = 7,944)	p value
Age (mean [sd#])	65.5 [21.19]	64	59.0 [23.13]	31	64.63 [21.6]	<0.001
Gender (% female)	52.87	94	55.46	20	53.19	0.079
TAS (median, [IQR##])	6 [2-15]	60	5 [2-14]	7	6 [2-15]	<0.001

#sd = standard deviation ##IQR = inter-quartile range

Table 14. Reasons for refusal of skin inspection

Reason	No of patients with each response	% of total patient refusals
Too ill	213	21.1
Consent declined	493	48.9
Other#	302	30.0
Total	1,008	100.0

'Other' included patients absent from the ward at the time of the survey who may have been in theatre, other departments or in active labour.

5.2 Reasons for refusal of skin inspection

PUPPS 3

Table 14 identifies the reasons 1,008 patients refused a skin inspection. The percentage of total population who refused a skin inspection was 12.7%. Within the refusal group, 213 (21.1%) were deemed too ill to participate. Consent was declined by either the patient or nursing staff for 493 (48.9%). It is important to consider the reasons for the refusals and how this group may have influenced the final prevalence results.

Comparison with PUPPS 2

The rate for "Too ill" (21.1%) is higher than those in PUPPS 1 (18.6%) and PUPPS 2 (19.8%); the rate for "Consent declined" (48.9%) is lower than PUPPS 1 (52.6%) but higher than PUPPS 2 (44.7%) and the rate for "Other" reasons (30.0%) is higher than PUPPS 1 (27.6%) and lower than PUPPS 2 (35.0%).

The rate of refusal was similar for patients under 18 years (12.5%) as for those over (12.6%).

5.3 Time from admission to survey

PUPPS 3

Patients who have a pressure ulcer have a longer time from admission to survey (TAS) 41.0% [95% CI 39.3 – 42.7] than those who do not (Mann-Whitney U test). TAS is defined as length of stay from admission to survey day. Again, it is unclear if patients stay longer because they have a pressure ulcer or have a pressure ulcer because they stay longer. The higher the stage of ulcer, the longer the patient's TAS, see Table 15 below.

Patients with a hospital acquired Stage 2 to Stage 4 pressure ulcer appear to stay longer than those patients with pressure ulcers present on admission. Mean TAS for Stage 2 and Stage 4 has increased from PUPPS 2 (19.9% and 28.2%).

According to data analysis, it can be concluded that most patients had been admitted for only a few days but a very small number had been admitted for very long periods. Some patients with ulcer have been admitted for more than 1 year.

Comparison PUPPS 1&2

The rate for Stage 3 decreased dramatically from 67.7% (PUPPS 2) to 24.3%. This is a decrease of 43.4%.

Table 15. Time from admission to survey by stage of pressure ulcer

Highest Stage	Mean TAS (days)	Standard deviation	Median TAS (days)	25th percentile	75th percentile	# N
No ulcer	14.8	65.5	5	2	13	5,663
Stage 1	18.7	36.8	9	4	19	412
Stage 2	25.5	143.4	12	5	23	599
Stage 3	24.3	30.9	15	7	35	90
Stage 4	39.1	62.7	21	11	40	112
Total	24.9	104.8	11	5	26	6,876

N is the number of valid observations. Table 15 includes all pressure ulcers identified (hospital and non-hospital acquired).

6. Education program

6.1 Interrater reliability

The PUPPS 3 education program was delivered to 618 surveyors (including site co-ordinators) of which 606 completed testing (98.6%). An 85% pass rate on the first interrater reliability test was achieved by 94.6% of the surveyors ($n = 573$), compared to 73.7% for PUPPS 2 and 60.5% for PUPPS 1. As data on the number of surveyors who had been involved in previous PUPPS was not collected it is difficult to identify the influence previous attendance may have had on the increase in first time passes.

6.2 Education program evaluation

Feedback on the education program from surveyors and site coordinators was overwhelmingly positive as reported in both PUPPS 1 & 2. Of 618 attendees, 558 evaluation forms were completed and returned representing a 90.29% response. Four questions utilised the previously used bipolar five point Likert scale (strongly agree — strongly disagree) to measure responses and maintain continuity of methodology. Results ranged from 90.9% to 98.6% positive responses (agree and strongly agree). The result remains similar to the range for PUPPS 2 (91.7% to 98.9%) and PUPPS 1 (89.6% to 97.7%). Provision was made for comment at each of the four questions and a final open question requested any further comments regarding the program. Feedback via the comment sections was also overwhelmingly positive.

7. Contextual data

The contextual data audit was completed by all health services prior to the education and survey days of PUPPS 3. This analysis includes all 86 health services, 136 sites, that completed the audit. The information is self-reported and therefore likely to contain a subjective component. Changes in contextual data from PUPPS 1 to PUPPS 2&3 are noted in Table 16a.

An increase in positive responses was seen across almost all contextual measures from PUPPS 1 to PUPPS 2 and to PUPPS 3. Analysis of the relationship of this data to pressure ulcer prevalence is problematic given the binary nature of the responses (either yes or no) and the use of the 86 health services as units despite the obvious operating differences between small rural and large metropolitan health services.

Although 81.6% of health services have an organisation wide strategy to reduce hospital acquired pressure ulcers, a smaller proportion (71.3%) have existing protocols and policies for the prevention and management of pressure ulcers.

A Pressure Ulcer (or Wound Management) committee was present in 68.4% of health services and 63.2% had an Executive Sponsor.

Health services who actively involved allied health disciplines in their pressure ulcer prevention and management strategies accounted for 81.6% of the cohort.

The Australian Wound Management Association Clinical Practice Guidelines for the Prediction and Prevention of Pressure Ulcers²⁰, which use designated levels of evidence as recommended by the National Health and Medical Research Council, was used by 66.9% of health services as the basis for their policies and strategic plan.

Table 16a. Change in quantitative contextual data

Factors or strategies	PUPPS 1	PUPPS 2	PUPPS 3	Change PUPPS 1 to PUPPS 3 (PUPPS 2 to PUPPS 3)	95% CI of change PUPPS 1 to PUPPS 3 (PUPPS 2 to PUPPS 3)	p value PUPPS 1 to PUPPS 3 (PUPPS 2 to PUPPS 3)
Existing protocols and policies on pressure ulcers in place	35.4%	66.2%	71.3%	35.9 (5.1)	35.9 (-5.9) 48.7 (16.1)	0.000 (0.364)
Education or program on pressure ulcer prevention and management in place	40.2%	66.9%	61.8%	21.6 (-5.1)	8.2 (-16.4) 35.0 (6.3)	0.002 (0.380)
AWMA clinical guidelines (or similar) in use	48.8%	68.4%	66.9%	18.1 (-1.5)	4.7 (-12.6) 31.5 (9.6)	0.008 (0.791)
Patient literature regarding pressure ulcers in use	3.7%#	26.5%	66.9%	63.2 (40.4)	54.3 (29.6) 72.1 (51.2)	0.000 (0.000)
Pressure reduction mattress replacement program	46.3%	78.7%	86.0%	39.7 (7.3)	27.4 (-1.7) 52.0 (16.3)	0.000 (0.114)
Specialist wound management staff with allocated time	46.3%	37.5%	44.9%	-1.4 (7.4)	-15.1 (-4.2) 12.3 (19.1)	0.841 (0.215)
Active wound or pressure ulcer committee	61.0%	69.1%	68.4%	7.4 (-0.7)	-5.7 (-11.7) 20.5 (10.3)	0.265 (0.901)
Pressure ulcer data collected as part of clinical risk management program	46.3%	70.6%	83.8%	37.5 (13.2)	25.1 (3.3) 49.9 (230)	0.000 (0.009)

This contextual factor reported for PUPPS 1 at health service level (4.2%) in VQC State-wide Report—2003, but was reported at site level for PUPPS 2&3.

Pressure ulcer prevention literature was supplied to patients in 66.9% of health services. The most commonly used patient information publication was the Victorian Quality Council (VQC) 'Move, Move, Move' flyer (66.9%). The VQC 'Preventing pressure ulcers—an information booklet for patients' was used in 44.1% of health services. 'Other' patient information was used in 36.0% of health services.

Specialist wound management staff with specific hours dedicated to this role were present in 44.9% of health services. A large proportion of staff from the smaller health services that participated in PUPPS 3 have wound or pressure ulcer management as their portfolio but with no additional management or clinical time allocation, i.e. they incorporate these responsibilities into their standard clinical working hours.

Collecting pressure ulcer data as part of clinical risk management programs are performed by 83.8% of health services surveyed.

Pressure ulcer risk assessment tools are used by 87.5% of health services and 86.8% of these require risk assessment to be performed on admission. Individual prevention plans are developed in 66.9% of health services.

Following the recommendations from PUPPS 2 61% of health services identified target areas for improvement, defined a goal and program to reduce prevalence.

Mattress replacement programs were occurring in 86.0% of health services. The proportion of total hospital mattresses replaced by static pressure reduction foam mattresses in Victorian acute and subacute health services is shown in Table 16b below.

Table 16b. Proportion of static pressure reduction foam mattresses replaced

% of mattresses replaced	Number of health services (% of total health services)
100%	35 (40.7)
90–99%	8 (9.3)
80–89%	10 (11.6)
70–79%	9 (10.5)
60–69%	8 (9.3)
50–59%	8 (9.3)
<50%	8 (9.3)
Total	86 (100.0)

Discussion

The PUPPS 3 report presents data collected as part of the third Victorian Pressure Ulcer Point Prevalence Survey. As well as information on prevalence, the report compares the PUPPS 3 data with that collected by the Victorian Quality Council (VQC) in PUPPS 1 in 2003 and PUPPS 2 in 2004. In addition, the report tracks health service progress in the implementation of recommendations made in the two previous PUPPS reports.

Prevalence and incidence surveys provide ‘measurable, longitudinal, event-specific, quality outcome indicators’²² and can be used to measure the effectiveness of prevention strategies and clinical practice^{23,24}. National and international healthcare agencies increasingly recognise pressure ulcers as ‘indicators of the overall quality of care provided by hospitals’^{12,22}. The major accreditation organisation for public hospitals in Australia, the Australian Council on Healthcare Standards (ACHS) has developed a ‘specific criterion to recognise the importance of the prevention and management of pressure ulcers to a patient’s health outcomes and quality of life’¹.

DHS through supporting the participation of Victorian health services in the PUPPS survey provides a major contribution to the state, national and international body of evidence on pressure ulcers. The PUPPS data also makes a significant contribution to pressure ulcer prevention programs in acute and subacute hospitals by providing reliable data baselines and valuable information on benchmarking. With three consecutive surveys completed using a consistent methodology, comparison between the data can be made confidently.

Multifactorial approaches to pressure ulcer prevention are the most effective. Therefore, contextual data on a number of issues provided by health services for PUPPS 3 is also discussed to provide an understanding of the circumstances and organisational environment from which the quantitative data was gathered.

Progress and improvement

Prevalence

Victoria's state-wide pressure ulcer prevalence has reduced significantly. The proportion of patients identified with pressure ulcers from the total patients seen in the PUPPS 3 population was 17.6%. This is a reduction of 8.9% from the PUPPS 1 result of 26.5% and 3.2% from the PUPPS 2 result of 20.8%.

As well as a reduction in prevalence, fewer patients were identified with multiple ulcers in PUPPS 3. The number of patients with more than 1 ulcer decreased by 6.2% compared with PUPPS 1 and 1.2% compared with PUPPS 2. In the PUPPS 3 population, only 13 patients had 6 or more ulcers compared with 35 in PUPPS 2 and 38 in PUPPS 3.

DHS comparative groups

The reduction in prevalence is further noted across a number of categories within the PUPPS 3 population. The 7 Department of Human Services (DHS) comparative groups represent health service campuses grouped together who share a similar casemix and size (bed numbers). From PUPPS 2 to PUPPS 3 all 7 DHS comparative groups show a consistent decrease in prevalence. This builds on the reduction from PUPPS 1 to PUPPS 2 where 6 out of 7 groups showed a decrease. Over the last few years several health service campuses have altered their casemix and patient throughput which in some cases may lessen their suitability for belonging to a particular group. A review of the eligibility of the members of each group by DHS is warranted to maintain the validity of benchmarking in these categories.

Medical specialty groups

The consistent decrease in prevalence is again evidenced across the medical specialty groups. Of the 7 major specialty groups, 6 showed a decrease from PUPPS 2 to 3. The combined specialties of 'Rehabilitation', 'Medical' and 'Surgical' accounted for 83.6% of the surveyed population and 87.2% of the patients with ulcers. Representing the largest single specialty group of patients the 'Medical' group (44.0% of patients surveyed and 46.6% of patients with ulcers) has shown a steady significant reduction in prevalence.

Surgical

The second largest group of patients the 'Surgical' group identified a prevalence within the specialty of 14.1%. The PUPPS 3 data does not collect specific operating details, however, the 'intraoperative period of patient care can be missed as a time of increased risk' and all surgical patients should be considered at risk of developing pressure ulcers²⁵. Preoperative assessment should include an evaluation of skin integrity and pressure ulcer risk factors with appropriate pressure reducing/relieving support surfaces ordered for the intraoperative and postoperative period.

Length of operative procedure is recognised as a risk factor for pressure ulcer development with incidence in surgical patients undergoing procedures greater than 4 hours being up to 21.2%, and it has also been suggested that 'in the US 23% of the total number of pressure ulcers developed in hospital are intraoperatively acquired'²⁶. Other predisposing risk factors for surgical patients can be related to exposure to operating room specific risk factors such as:

- 'pooled moisture from prep solutions;
- skin shearing and friction during positioning;
- patient's position and use of positioning devices;
- negativity, (defined as the layering of materials between the patient and the pressure-reducing surface),
- intraoperative hypotension and;
- alteration in haemodynamic and circulatory status related to patient's position and blood loss.²⁷

Specific types of surgery or anaesthesia carry their own specific risk factors. For example patients receiving peripheral nerve blocks are at higher risk of developing heel ulcers and require appropriate preventive measures to avoid this complication²⁸.

Care should be taken to check the skin integrity of surgical patients thoroughly. Post operative ward areas may be 'incorrectly blamed' for pressure ulcers which originated during operative procedures as ulcers may not become visible for several days due to 'damage resulting from intraoperative pressure developing in the muscle and subcutaneous tissues and progressing outward' over a period of time²⁷.

Palliative Care

The ‘Palliative Care’ group also showed a consistent decrease in prevalence within the specialty, although the prevalence remains high at almost 1 in 3 patients being identified with a pressure ulcer. Palliative care patients are particularly vulnerable to skin breakdown along with other organ system failure, as damage at this stage of a patient’s life is often unavoidable²⁹.

Obstetric

PUPPS 1 identified 2 patients with pressure ulcers in the ‘Obstetric’ group; PUPPS 2&3 identified none. This group of patients are considered at very low risk and future surveys may reconsider their inclusion in the survey population^{30,31}.

Spinal

The ‘Spinal’ medical specialty showed a consistent increase in pressure ulcer prevalence from PUPPS 1 to PUPPS 2 and PUPPS 3. As previously noted, these results need to be interpreted with caution as there were only very small numbers in the survey. The confidence interval is therefore very wide and overall statistical change between PUPPS 1 and PUPPS 3 was not significant. It should be remembered that following spinal cord injury (SCI), pressure ulcers ‘remain among the most common secondary conditions. Pressure ulcers are also among the leading causes for unplanned rehospitalisation of people with SCI, resulting in disproportionately longer hospital stays and more expensive treatment than other medical complications.’²¹

Risk assessment

Almost 2/3 of the surveyed population had evidence of a risk assessment tool (RAT), an increase of 13.2% from PUPPS 2 and 25.1% since PUPPS 1. There appeared to be an association between risk assessment and patients with ulcers identified. PUPPS 3 results indicate that the higher the level of risk assessment on the screening tool, the more likely that a pressure reducing/relieving device was found insitu. This may indicate that patients who had a pressure ulcer risk assessment completed had been subjectively deemed to be at higher risk than other patients, or that hospital sites where assessment was regularly performed were also more likely to regularly use pressure reducing/relieving devices in their prevention strategies.

Use of a RAT in identifying patients ‘at risk’ of developing pressure ulcers is included, with a proviso, in most clinical guidelines on pressure ulcer prevention and management and it is often suggested they are used in conjunction with clinical judgement^{20,32-34}. But there remains much debate in the literature on the value and accuracy of pressure ulcer risk assessment tools with opinions noting ‘it is not clear if these scales are better than clinical judgement or if they improve outcomes’ and ‘risk assessment scales, although poor predictors of risk of pressure ulcer development, were still a better alternative than relying on nurses’ clinical judgement’¹⁶. More pragmatic authors suggest that ‘although pressure ulcer risk assessment tools have been criticised, they support the systematic review of an individual’s condition at any given time’⁴³⁵. Risk assessment tools can ‘increase the intensity and effectiveness of preventive interventions’¹³ and ‘their widespread use in clinical practice suggests that nurses find them useful’³⁶. One key point is that RAT ‘can only be of value in preventive care if they ‘prompt the provision of effective and appropriate interventions to individual patients’³⁵.

It is also important to remember that ‘an acute susceptibility to pressure ulcers is a medical emergency as severe pressure damage can develop within one to two hours. Also the patient may have been experiencing tissue ischaemia for some time before admission’³⁷. This highlights the importance of taking preventive measures in the Emergency Department or at the first point of healthcare contact for the patient before any formal assessment and documentation is undertaken and, reviewing the assessment regularly and updating the preventive intervention, especially when the patient’s condition changes³⁷.

Debate from experts and peak bodies in pressure ulcer prevention on the value of RAT in general and the validity of specific tools make it difficult to choose an appropriate RAT for Victorian organisations. ‘Most scales have been developed in an ad hoc fashion, based on opinions of the relative importance of possible risk factors’³². Following development Bonomimi suggests testing the RAT for use within the relevant specialty and local testing should be carried out ‘to establish an appropriate cut-off point to indicate the risk threshold, that is, the score at which an individual falls into the ‘at risk’ category’³².

The development of a site specific RAT was undertaken recently by a Victorian metropolitan health service following their concern that the RAT they had been using did not accurately predict patients at risk of developing pressure ulcers. The new RAT was developed for and tested within their specific population and compared with the RAT previously used. The new 'local' RAT was found to be easy to use, useful in reducing patient's risk of pressure ulcer development and a key element in the hospital's comprehensive pressure ulcer prevention and management program³⁸. Victoria is in an ideal position to facilitate further research in this area to develop an appropriate RAT specific to the needs of acute and subacute health facilities, which would improve the predictability of patients 'at risk' and aid the targeted use of preventive resources. The alternative is to explore the 'possibility of a completely new ways of predicting those at risk of pressure ulcer development that is based perhaps on physiological parameters'³⁶.

Pressure reducing/relieving devices

Across the PUPPS 3 surveyed population, there was an increase in patients with a pressure reducing/relieving device insitu compared to PUPPS 2. Much of this increase can be attributed to the state-wide Mattress Replacement Program that funded health services to replace a minimum of approximately 50–60% of their standard mattresses with static pressure reduction foam mattresses (categorised in the survey as 'replacement mattress static') in early 2005. The number of patients with 'replacement mattress static' increased from 1,129 (21.9%) in PUPPS 1 and 1,371 (20.6%) in PUPPS 2 to 3,502 (76.7%) in PUPPS 3.

From PUPPS 2 to PUPPS 3 there is an increase of 22.3% in the proportion of patients with a reducing/relieving device insitu and 17.6% in the number of patients with pressure ulcers who had a device insitu. Of the patients with pressure ulcers 77.2% had a device insitu.

There appeared to be an association between risk assessment and patients with a device insitu. Of the patients with a device insitu, 72.7% had evidence of a risk assessment. Of the patients without a device 58.9% had evidence of a risk assessment. This may indicate a trend towards the broader use of pressure reducing/relieving devices by health service staff across Victoria or that hospital sites where assessment was regularly performed were also more likely to regularly use pressure reducing/relieving devices in their prevention strategies.

The international literature generates a great deal of debate in the area of pressure reducing and relieving devices and support surfaces^{14,39,40}. And while there is an extensive and eclectic range to choose from there is 'little guidance on clinical and cost-effectiveness'¹². There is, however, a good level of evidence to support investment in a 'static-led' approach, replacing all standard hospital mattresses with static pressure reduction foam as has been done in the majority of Victorian health services^{18,41}. Health services with less than 100% replacement should consider the purchase of the high quality pressure reduction foam mattresses to replace their remaining standard mattresses as soon as is practical. This investment in static pressure reduction foam replacement mattresses can mean a reduction in the use of more expensive dynamic systems as part of an appropriate allocation of equipment according to level of risk.

One British acute general hospital reduced the choice of pressure reducing support surfaces to one static and one dynamic support surface system for beds and chairs through a comprehensive evaluation process. The static pressure reduction mattresses were installed on all beds. The chosen dynamic systems and chair cushions (both static and dynamic) were brought, stored centrally and provided to individual patients when the assessed level of risk indicated the need. Previously staff had been expected to 'match patient's needs with varying levels of dynamic mattress efficiency'³⁵. Expensive systems can spend a significant amount of time gathering dust when owned by a single ward or unit and centralising or having a hiring arrangement can present a more effective use of financial resources. Coupled with the use of high quality static mattresses as the base for all patients, the system was simpler and cheaper and the staff happier. The institution reduced pressure ulcer prevalence from 19% to 6% and generated a saving of £50,000 (A\$122,500)³⁵.

To inform decision making for purchase or use by clinicians, evaluation criteria for dynamic support surfaces should be developed along the lines of the minimum technical specifications and standard criteria for the evaluation of static pressure reduction foam mattresses that were developed through the DHS state-wide mattress tender⁸.

It is important to remember that the use of devices is only one component of a comprehensive prevention plan and although they will alleviate pressure to varying degrees they are intended to reduce the risk and aid in healing. This is as part of a more comprehensive prevention plan which should involve skin care, hydration, nutrition, repositioning regimes and education. ‘Support surfaces will not completely eliminate the effects of pressure on the skin and the musculoskeletal system, nor will they heal existing pressure ulcers’⁴².

Documentation

Documentation related to the progress or management of pressure ulcers showed a small increase from PUPPS 2, 45.0% to 50.9%. The highest stages of ulcer, Stages 3&4, had documentation found in 86.7% and 87.5% respectively. There was documentation for just over half of patients with Stage 2 ulcers as their highest stage of ulcer. Patients with Stage 1 ulcers as their highest stage of ulcer had documentation in only 28.6% of cases. The difficulty of recognising Stage 1 pressure ulcers is commonly noted and likely to lead to the underreporting of these ulcers in particular⁴³. Efforts to improve documentation could be assisted through increased education of staff in the classification of pressure ulcers, their aetiology, prevention and management. Pressure ulcer grading is a complex skill that requires training and time to develop⁴⁴.

In debriefing sessions completed at the end of the survey day PUPPS 3 surveyors frequently noted the quality of documentation to be poor or absent. It is of concern to note that 24 patients with Stage 3 or 4 ulcers had no documentation about the management of these ulcers identified in the medical record. It would be useful to further investigate opportunities to improve pressure ulcer documentation and to work with health information staff to review the influence and effectiveness of the introduction of the L89 codes in the Australian Classification of Diseases and Procedures (ICD 10AM) introduced in July 2004. More consistent high quality documentation by clinical staff is needed to fulfil the obligation to provide an accurate record of clinical decision making, care provision and outcomes of care in patient medical records⁵.

Context

There was an increase in positive responses in almost all contextual data measures from PUPPS 1 to PUPPS 2&3. The number of health services with existing protocols and policies on pressure ulcer prevention and management doubled from 35.4% in PUPPS 1 to 71.3% in PUPPS 3. Also noteworthy is:

- the increasing use of patient literature (from 3.7% in PUPPS 1 and 26.5% in PUPPS 2 to 66.9% in PUPPS 3);
- individual prevention plans (from 26.5% in PUPPS 2 to 66.9% in PUPPS 3);
- more health services with mattress replacement programs; and
- more pressure ulcer data collection taking place.

Active Allied Health involvement in pressure ulcer prevention and management strategies was reported for 81.6% of the cohort. Given the increasing evidence of the key role nutritional status plays in the prevention and healing of pressure ulcers it is encouraging to note that just over half the health service campuses reported the involvement of nutrition/dietetics in their pressure ulcer prevention programs⁴⁵⁻⁴⁷.

Health services were also asked to comment on the impact and influence of the key recommendations from the VQC State-wide PUPPS 2 Report 2004. Health services stated the recommendations provided a starting point for their prevention programs and formed the basis for an organisation-wide strategy or framework. Some of the common themes included:

- raised general awareness of the problem of pressure ulcers and the need for early assessment, intervention and reporting;
- a positive influence on all levels of the organisation from executive to front line staff;
- more support for existing roles such as wound management staff;
- the sharing of local and state-wide data encouraged staff to take a more active role in developing strategies;
- increased the multidisciplinary approach;
- improved clinical staff skills, particularly in relation to staging and the impact of pressure ulcers on patients; and
- improved patient knowledge and expectations.

The provision of the static foam pressure reduction mattresses through the DHS State-wide Mattress Replacement Program was overwhelmingly endorsed as a useful and positive influence on prevention programs, providing staff with tangible evidence that collecting and sharing data can make a difference. Staff also found requests for pressure relieving equipment was given more credibility as it could be supported by data.

The individual reports with site-specific data were generally cited as valuable, providing local data and evidence of improvement or areas in need of additional effort. The information was presented in a format that was easily understood and could be presented to all levels of the organisation. It was reported through pressure ulcer and wound specific and general committees at ward, management, executive and board level and disseminated through hard and electronic copies, brief flyers, posters and as part of other reports. The data also helped re-focus efforts and programs already in place.

Benchmarking information was often cited as a useful exercise for providing comparison with similar health services and an opportunity to track progress and congratulate staff on improvements. Comparison data between PUPPS 1&2 was also used as a catalyst where there had been no action after PUPPS 1 and little change in PUPPS 2 results.

Following the specific recommendations from PUPPS 2, 61% of health services identified target areas for improvement, defined a goal and program to reduce prevalence and incidence of pressure ulcers. Improvement strategies included systemic initiatives such as increased education opportunities for staff, and regular review and audits of:

- pressure ulcer incidents;
- risk assessment tools;
- mattresses and other pressure reducing/relieving devices; and
- wound products.

Other interventions targeted increasing mobility by the use of multidisciplinary input to develop functional maintenance programs and individual nutrition plans. Health services reduced duplication with risk assessment tools and wound charts, improved or streamlined documentation and introduced local clinical champions to lead initiatives.

Implementation was also spread across nursing homes and aged care areas where these were part of the larger health service. Organisational roll-out of initiatives had taken place in just under half the health services indicating there is ongoing improvement planned and progress to be made. Large organisations with complex competing priorities require a significant period of time to achieve and sustain change. The additional data provided via the distribution of PUPPS 3 reports will provide additional impetus to programs.

Barriers to improvement cited by health services included:

- lack of a dedicated staff resource or allocated time to lead and manage programs which has meant a slower implementation — particularly difficult in small health services where staff have responsibility for several portfolios;
- competing patient safety priorities such as falls and medication safety initiatives; and
- the cost of additional equipment and, staff being too busy with an already large unpaid time element to many positions.

Being able to show tangible benefits and definite improvement in outcomes has been cited as the biggest asset in reducing barriers.

From the increase in these contextual factors and statements on the influence of the previous PUPPS reports, it appears that the prevention and management of pressure ulcers are now 'on the agenda' for most health services, recognised as a key patient safety issue and requiring a multifactorial approach as recommended in the VQC PUPPS 1&2 reports^{7,8}.

Unchanged outcomes

A number of PUPPS 3 data showed little or no change from PUPPS 1&2.

Severity

The proportion of pressure ulcers identified at each stage (1–4) was similar to PUPPS 1&2. Stage 1&2 ulcers accounted for 87.4% of ulcers identified. Ulcers that involved more than superficial skin damage (Stages 2, 3&4) accounted for 59.7% of all ulcers identified. The use of a pressure ulcer classification system is vital in creating an unambiguous language to assess and describe the severity, treat and track the progress of preventive or therapeutic intervention^{44,48}. It is important when looking at the classification of pressure ulcers that stages 1&2 ulcers are not dismissed as ‘less’ important.

The staging of an ulcer is only one part of its burden, and a lesser stage does not always mean a decrease in severity. The use of sequential numbers in the classification system ‘implies orderly progressing of tissue breakdown from one stage to the next. This numerical ranking of stages also implies progression in ulcer severity, which may be erroneous’⁴⁹. Stage 1&2 ulcers can still have a significant impact on patients and resources and are the most ‘nurse sensitive’ ulcers. For example ‘which is worse: a small grade 4 pressure ulcer on an ankle or an extensive grade 2 ulcer on the buttocks? The latter is likely to take longer to heal, cause the patient more disability and discomfort and have greater cost implications for the [health service]. Yet, if one were to be provided with just the grade, one would probably assume the opposite’⁴⁸.

Distribution

The anatomical distribution of ulcers identified is similar to previous PUPPS results and to international studies^{2,19,50}. The sacrum/coccyx area and the heels remain the most common sites for the development of pressure ulcers, accounting for 50% of all ulcers, the lower limb accounted for 47.2% and the pelvic girdle for 36.3%. Whilst this shows little change since previous surveys, it continues to indicate where the greatest opportunities for improvement can be focused. Incidence studies in individual wards or units could further define where the most effective prevention initiatives should be targeted. This information should be linked to prevention plans, patient education and the use of support surfaces or other pressure relieving devices.

Demographic variables

Patients over 60 years of age accounted for 80.8% of patients with ulcers. In the PUPPS 3 population prevalence tended to increase with increasing age. Other demographic variables were similar to previous populations apart from gender. PUPPS 3 data suggests patients with a pressure ulcer are more likely to be older, female, and unable to independently reposition themselves.

Paediatric patients

Paediatric patients accounted for 7.2% of the surveyed population and 2.3% (n = 28) of all patients with ulcers. Paediatric and neonatal patients are one of our most vulnerable populations in health and at risk of pressure ulcers for many of the same reasons as adults. ‘The negative effect of mobility and physiologic instability on a patient’s skin does not discriminate by age or developmental level’ and for some factors specific to their age, illness and size⁵¹. Paediatric and neonatal specific risk assessment tools are few and further research is required in this area^{51–53}. In order to develop best-practice models for managing pressure ulcers in children, specific surveys of prevalence and incidence in the paediatric and neonatal populations are indicated⁵⁵. In particular, ‘pressure ulcers represent a serious iatrogenic injury in the [neonatal and paediatric] critical care environment where the use of technological devices is the norm and immobility and poor perfusion are common’^{51,55,56}.

Hospital acquired ulcers

Hospital acquired pressure ulcers accounted for 2/3 of the ulcers identified as was found PUPPS 1&2. Again some patients with pressure ulcers present on admission developed additional pressure ulcers during their admission. Pressure ulcers were defined as being hospital acquired if there was no documentation referring to the presence of a pressure ulcer within the first 24 hours of admission. This definition for ‘hospital acquired’ pressure ulcers has been used in other studies but it has an inherent limitation in its reliance on the accuracy of documentation by clinical staff in the medical record^{19,57}. ‘Hospital acquired pressure ulcers are a recognised nursing sensitive outcome contributing to patient discomfort, length of stay, and expense’⁵⁸.

More accurate assessment and documentation of patient's skin integrity on admission may show a decrease in hospital acquired pressure ulcers. Incidence surveys which capture skin integrity data on admission could provide valuable detail on the accuracy of hospital acquired pressure ulcers and track improvement in preventing their development.

Time from admission to survey

Time from admission to survey (TAS) for PUPPS 3 is 41.0%, for PUPPS 2 it was 45.0%. Again, it is unclear if patients stay longer because they have a pressure ulcer or have a pressure ulcer because they stay longer. The higher the stage of ulcer, the longer the patient's TAS. Patients with hospital acquired ulcers appear to stay longer than those with pressure ulcers present on admission. This suggests that health services could reduce length of stay if a reduction in the development of hospital acquired pressure ulcers could be achieved. The relationship between pressure ulcers, length of stay and the associated cost to health services and the patient should be the subject of further research to prioritise the impact of these largely preventable events.

Opportunities for future improvement

Reducing immobility and increasing repositioning

Previous PUPPS reports have detailed the need for comprehensive strategies to reduce pressure ulcer development^{7,8}. Patients unable to independently reposition themselves present an ideal opportunity for health services to focus their efforts and achieve improvement. For PUPPS 3 the prevalence of ulcers was 2.6 times higher in patients unable to independently reposition, than in those able to reposition. In both cases (i.e. those able to and those unable to independently reposition), more than 70% of patients with ulcers had hospital acquired ulcers. This is a strong indication that additional care should be taken when developing a pressure ulcer prevention plan for patients who are or will be unable to independently reposition themselves. Patient education, pressure reducing/relieving support surfaces or devices, a repositioning regime and early mobilisation to reduce periods of immobility should be part of the plan. ‘Immobility, in the absence of additional factors, is rarely the primary cause of pressure ulcers. Even small bodily movements such as leaning forward or side to side when seated are usually sufficient to give adequate pressure relief.’¹⁰

In addition, staff appear to be recognising the risk of immobility with almost 3/4 of patients (73.2%) who were unable to reposition identified with a pressure reducing/relieving device in situ. This is a higher proportion than in those able to reposition themselves (63.6%). There is still opportunity for improvement as 66 of 503 (13.1%) patients with ulcers and unable to reposition did not have a device in situ.

In patients unable to reposition, 56.1% were assessed as no, low or medium risk, compared to 89.9% of those able to reposition. The results suggest there is awareness of the risk of being unable to reposition. Of patients unable to reposition and who were assessed as having none, low or medium risk, nearly forty percent (38.5%) did in fact have ulcers. In contrast in those able to reposition and who were assessed as none, low, medium risk, only 12.3% had ulcers. This suggests that the sensitivity of current risk assessment tools is poor or that additional training for risk assessment is required.

Of 3,056 patients categorised in the “Medical” group 569 had ulcers. Of those, 329 (57.8%) had been able to reposition and 232 (40.8%) unable. It’s important to add that of 232 patients unable to reposition 180 (77.6%) had hospital acquired ulcers; of 329 patients able to reposition 26 (7.9%) had hospital acquired ulcers. In patients unable to reposition, and in the ‘Medical’ group, in those who have ulcers nearly 80% were acquired in hospital compared to 7.9% in those who are able to reposition. This suggests that an opportunity for improvement in ‘Medical’ specialty wards/units could be to focus on awareness and education related to risk assessment and preventive strategies to reduce periods of immobility could be put in place to reduce the number of hospital acquired ulcers. Again the use of incidence surveys in this situation would be most beneficial to identify opportunities for improvement and to track the progress of interventions.

Risk assessment and pressure reducing/relieving devices

In regard to risk assessment it is important to emphasise the need for staff to act on the assessment, develop the prevention plan, institute the intervention and assess the appropriateness and effectiveness of the plan regularly. In the ‘high or very high risk category’ 122 patients (15.8%) had no device in situ and 33 of these patients (4.3%) had at least one pressure ulcer. No devices were in place for 272 (22.3%) patients with ulcers including 30 (2.4%) who had either a Stage 3 or a Stage 4 as their highest stage of pressure ulcer. Feedback from surveyors noted that in a number of instances, patients at ‘high or very high risk’ were seated in chairs for long periods of time with no pressure reducing support surface.

Staff education

Preventing pressure ulcers is generally agreed to primarily fall within the nursing domain, with nurses being identified as ‘the first line of defence’ in the maintenance of skin integrity, with extensive knowledge about pressure ulcer prevention and management^{43,59–62}. Pressure ulcers, particularly Stage 1 & 2 are seen as ‘nurse sensitive’, i.e. nurses are in the best position to reduce ulcer development^{48,58}. However, a review of nursing and other health profession curricula may show that students are exposed to little material in the undergraduate period with information being sparse⁵⁹. An increase in the pressure ulcer content of courses may be indicated. Timing of the delivery of pressure ulcer education to health professionals can be debated, but the value of increased staff education as part of successful pressure ulcer prevention programs is well documented^{59–62}. The presence of expert clinical resources in pressure ulcer and wound care ‘can also educate other team members on the use of support surfaces, monitor patient outcomes, serve as liaison to vendors, and develop policies and procedures for the institution’^{44,61}. Health services should include basic pressure ulcer education as at least an annual competency, with regular targeted education sessions for local needs. This could include practical examples such as ‘reduction of heel pressure ulcers in vascular patients who are at risk because of reduced extremity perfusion’ in cardiac surgery units⁶¹.

Prevention rather than cure

The elements of successful pressure ulcer prevention programs are well documented and have formed the recommendations of previous PUPPS reports^{7,8}. Victorian public health services have made significant progress in pressure ulcer prevention showing an interest in getting the basics in place⁶³. For health services, pressure ulcer prevention basics are a comprehensive pressure ulcer management program which contains the elements of:

- risk assessment;
- individual prevention plans with turning regimes, pressure reducing support surfaces and devices and nutritional assessment, patient, carer and staff education;
- organisational policies based on best practice clinical guidelines; and
- regular collection and review of pressure ulcer data.

Health services should also have a multidisciplinary planning group with executive support that oversees the program and regularly collects, reviews and shares information on the progress of initiatives and access to expert pressure ulcer clinicians for additional support.

Victoria has made progress but now there needs to be a further shift in attitude towards the principle that ‘pressure ulcers are preventable not inevitable’. Resources are far more effectively spent on prevention rather than cure³⁶. Preventive measures need to be seen as routine and incorporated into the daily practice of clinicians and reported and reviewed at all levels of the organisation, with input from clinical and non-clinical areas.

Prevalence and incidence surveys

As previously noted, prevalence studies provide ‘measurable, longitudinal, event-specific, quality outcome indicators’²² and are useful tools for benchmarking specific clinical practices¹⁹. For data which can ‘reflect the nosocomial problem’ identifying site specific issues and tracking the outcomes of planned change, incidence studies are more accurate and sensitive than prevalence studies alone. Also, the significance of longitudinally collected data becomes more important over time as trends and changes are more easily recognised²². The value of sharing and communicating the comprehensive results and outcomes from PUPPS 3 in this report are an essential element of the success of the PUPPS projects and the improvement in pressure ulcer prevention by Victorian health services. They are the documented evidence of improvement or the need to improve and a ‘tangible benefit’ that has helped to overcome barriers to change.

With health services now needing to target specific predisposing risk factors and high risk populations within their organisations, facilitation by DHS of annual prevalence and incidence surveys could ensure consistent, reliable data is available for strategic planning on a state-wide and local level²².

Organisational change

Though prevalence survey information is extremely useful, ‘data alone rarely tells the whole story’⁶². Addressing the need for improvement and comprehensively planning change is essential for sustainability. ‘In healthcare organisations, change is universal, driven by technology, shifting limitations on healthcare financing mechanisms, and changing healthcare needs’⁶².

Moore & Wise reviewed types of change when describing the lack of progress and sustainability in reducing hospital acquired pressure ulcers in a large acute university medical centre. Type I change was described as ‘changes behaviour or some aspect of system processes without materially changing the system itself—that is, interpersonal and interdepartmental relationships are affected minimally and do not require significant adjustment by the participants.’ Type II was described as the ‘changes cause some fundamental change in the system itself. It affects many functions of a system, including roles, value systems, and other cultural elements. Such changes require that many persons within the organisation reassess their roles, relationships, values and priorities with respect to the new order of behaviour and responsibility. In addition to the structural elements required of type I change strategies, these “transformational” changes require efforts in managing human resources and political and cultural elements issues’⁶².

In the organisation described by Moore & Wise, the pressure ulcer prevention committee found that although they had developed new protocols, introduced a risk assessment tool, bought new pressure reducing mattresses and conducted extensive staff workshops, this had little effect on the hospital acquired prevalence rate at their second survey. But, by identifying the ‘driving and opposing forces’ in relation to organisational change, the committee realised the change needed to be more comprehensively owned by all staff through additional support, role modelling and participation. Staff can have the required knowledge but not apply it. Change agents were needed to help staff develop a ‘sense of competence and control with regard to the new skills required of the activity’. The skincare activities needed to occupy a higher position on staff members’ personal priorities⁶². Staff from all areas were invited to an expanded committee; data for each unit was collected, shared and discussed frequently.

The committee also provided a number of other initiatives such as ongoing education and support about the ‘new’ practices such as reducing multiple layers of linen and underpads between the patient and the pressure reducing mattress, which incidentally achieved cost savings. The hospital reduced their overall prevalence from a high of 21% to 11.5% over 4 years and reduced their hospital acquired prevalence from 21% to 6.9% in the same period.

Given the clinical governance model that frames quality improvement in Victorian health services, and the parallels noted in the example above, examining a change model which supports responsibility for quality care at all levels of the organisation warrants further investigation and could help health services develop a stronger emphasis on the prevention of hospital acquired pressure ulcers.

Victorian health services have introduced or maintained comprehensive programs and initiatives towards the prevention and management of pressure ulcers. Through incorporating the PUPPS 3 data in planning, implementing action based on the recommendations of all PUPPS reports and incorporating change management practices further improvement can be achieved and sustained.

Limitations of the study

The limitations of PUPPS 3 are similar to those of PUPPS 1&2. Inter-rater reliability testing was limited to theoretical assessment due to logistical and cost issues associated with clinically assessing the surveyors. The risk to data collection presented by this limitation was reduced by several factors. The protocols ensured the presence of a member of the Core Team of pressure ulcer experts on survey day, which supported clinical decisions regarding staging, particularly if there were 5 or more pressure ulcers found on one patient. Surveyors also repositioned patients with reactive hyperaemia off the affected area and re-assessed the area 30 minutes later for signs of residual non-blanchable erythema.

Limitations to staging within the AWMA definitions:

- All blisters were staged as Stage 2 irrespective of whether tissue within or surrounding the blister showed evidence of necrosis;
- In the presence of eschar (black, dry, necrotic tissue) the pressure ulcer was staged as a Stage 4 pressure ulcer as opposed to being defined as unstageable⁶³.

Conclusion

Pressure ulcers are a largely preventable patient safety issue, recognised internationally as a leading cause of harm to patients. A comprehensive program of preventive strategies can achieve significant reduction in pressure ulcer development^{2,61,62}.

Victorian public hospitals began or continued to implement a multifaceted, multidisciplinary preventive approach recommended in the first VQC PUPPS Report to systematically address this patient safety issue. In this third pressure ulcer point prevalence survey the state-wide mean prevalence has been reduced from 26.5% in 2003 and 20.8% in 2004 to 17.6% in 2006.

Improvements have been made in the use of RAT, pressure reducing/relieving devices and documentation. More policies have been developed, patient literature is being provided, more mattress programs are in place and more data is being collected and reviewed. Most health services use a multidisciplinary group to lead and manage pressure ulcer prevention in their organisations.

The challenge for health services is now to invest in pressure ulcer prevention as a priority, building a strong commitment from all levels of the organisation to reduce hospital acquired pressure ulcers. Health services should continue the use of risk assessment-based individual prevention plans for patients that contain skin care, pressure reducing support surfaces, turning regimes to reduce patient immobility as a priority, nutrition and education.

Data should continue to be collected by health services and DHS through prevalence and incidence studies to inform strategic planning, resource allocation and to track improvement.

There should be a state-wide expectation of continued improvement and sustainability supported by research into pressure ulcer prevention and management. Key organisations should work together to improve the education, prevention and management of pressure ulcers for staff involved in caring for patients.

The use of this data collection and reporting methodology nationally could lead to even greater reduction in pressure ulcer development, positioning Australia as a leader in pressure ulcer prevention and management.

PUPPS 3 has supplemented the significant data set provided by PUPPS 1&2 and has provided health services with reliable information to review and refine their pressure ulcer prevention and management programs. Victorian health services have taken comprehensive steps to sustain their focus on pressure ulcer prevention. Victoria should aim to embed the maintenance of skin integrity and pressure ulcer prevention as a routine responsibility and practice for all health service staff and reduce the benchmark still further.

Recommendations

Sustained improvement in pressure ulcer prevention should be based on the principle that: “Pressure ulcers are preventable – not inevitable.” The following recommendations, summarised in Tables 17a & 17b are made to health services and DHS based on the PUPPS 3 results, current best practice and available literature on successful quality improvement strategies in this area.

Table 17a. Summary of key recommendations for health services

Summary of key recommendations for health services:
Health services should develop a strong emphasis on the prevention of hospital acquired pressure ulcers with commitment from all levels of the organisation.
Risk assessment-based prevention plans that are reviewed regularly and contain skin care; pressure reducing support surfaces; turning regimes; nutrition and education should be developed individually for patients.
Strategies to decrease patient immobility and increase opportunities to reposition should be implemented.
Pressure ulcer prevalence and incidence data should be collected and reviewed to inform strategic planning, resource allocation and track improvement.

Commitment to prevention

Health services need to develop a strong emphasis on prevention of pressure ulcers as a key patient safety issue. As health services work within a clinical governance framework, responsibility for improving pressure ulcer prevention lies with staff at all levels of the health service. Planning for pressure ulcer prevention should include recognising strategies for achieving organisational change to help establish a high level of pressure ulcer prevention as routine practice. Data and information on pressure ulcer should routinely be reported to all levels of the organisation: ward, management, executive, board and the public.

Dedicated staff resources should be allocated the responsibility to lead and manage pressure ulcer prevention and management programs. These staff resources need to include both clinical and corporate champions. Clinical experts in pressure ulcer prevention and management should be available to advise, plan and manage care and provide education to other staff to increase organisational expertise in this area.

All clinical staff should receive education on pressure ulcer prevention and management. Health services should consider annual competency assessments in this area which could be linked to an annual prevalence and incidence survey day. Other education sessions could be incorporated at orientation and routine sessions with specific content ward/health service education sessions.

Risk assessment-based prevention plans

Health services need to incorporate assessment and planning for pressure ulcer prevention in the admission assessment of all patients. The planning should include the 6 elements outlined below:

1. Assessment of pressure ulcer development risk:

- Use a risk assessment tool on admission, (preferably commenced in the Emergency Department or first point of health service contact such as pre-admission clinic) to initiate preventive intervention.
- Target high-risk patients, e.g. pre-admission clinics could identify patients undergoing surgery lasting > 4 hours and book high quality support surface for patients both intra and post-operatively.
- Initial assessment should include an examination of skin integrity with documentation and reporting of any pressure ulcers present on admission.

2. Skin care:

- Incorporate measures to address skin care specific to the patients needs: e.g. moisturisers for dry skin or a referral for assessment from the continence expert to minimise moisture from incontinence.
- Involve other staff as required in planning including: medical, nursing, nutrition, podiatry and occupational therapy.

3. Use pressure reducing support surfaces

- Replace all basic hospital mattresses with high quality static pressure reduction foam.
- Use additional pressure reducing support surfaces routinely according to level of assessed risk and clinical judgement. Develop a flow chart to assist staff identify the most appropriate surface.
- Incorporate specific surfaces or devices for specific groups of patients: e.g. all patients admitted with a fractured neck of femur to have an alternating pressure reducing support surface and 4/24 repositioning regime from time of arrival in the hospital; or all patients undergoing knee surgery to have a wedge/pillow to elevate the heel for first 24/24 or until conscious state and exercise suggest otherwise.

4. Education

- Patients to be routinely given information in admission documentation packs, particularly target those patients at higher risk. Education to be reiterated as the patient's condition changes, with emphasis on prevention and repositioning/mobility.

5. Document

- Document assessments, prevention and management plans clearly in medical records and other relevant documents.

6. Review

- Prevention plans to be reviewed routinely and as the patient's condition changes, particularly their ability to independently reposition.

Increase opportunities to reposition

Identify specific target areas of high patient risk or volume such as medical specialty units and focus resources on educating staff and raising the awareness of risk assessment and preventive strategies to improve the early and frequent repositioning of these patients using all the points outlined above.

Collect and review data

Collect and review data on pressure ulcers to inform strategic planning and track improvement. Record all pressure ulcers identified as an adverse event on the health service incident reporting system. Include as a minimum the source, i.e. present on admission or hospital acquired, the stage and location of the pressure ulcer(s). Unit and organisation based data should also include data from prevalence and incidence studies, improvement initiatives, audits of documentation, equipment, costing and education. A Moderate Achievement (MA) as required by the Australian Council on Healthcare Standards (ACHS) for the standard on pressure ulcers (Standard 1.7), requires health services to use incidence studies trended over time to define their level of achievement in this area.

Table 17b. Summary of key recommendations for DHS

Summary of key recommendations for DHS:
Build expectation of continued improvement and sustainability into state health policy.
Facilitate annual pressure ulcer prevalence and incidence surveys and reporting, incorporation of data into existing suite of quality indicators.
Support research into initiatives to improve pressure ulcer prevention and management.
Work with key organisations to improve the education, prevention and management for staff involved in caring for patients with pressure ulcers.

Build expectation of continued improvement and sustainability

Review state-wide policy documents to incorporate the expectation that pressure ulcers are seen as a key indicator of the quality of care in an organisation. Health services should provide evidence of sustainable prevention and management programs with specific targets for improvement.

Facilitate a review and raise awareness of state-wide pressure ulcer documentation through data associated with the ICD 10AM L89 codes used in the Victorian Admitted Episodes Dataset.

Annual pressure ulcer prevalence and incidence surveys

Facilitate annual (as a minimum) state-wide prevalence and incidence surveys to identify more specific pressure ulcer data and to continue monitoring outcomes and improvements.

Research

Sponsor research in areas such as: an acute and subacute health service appropriate pressure ulcer risk assessment tool for Victoria and, predictive risk models for specific high risk or high volume patient areas.

Pursue partnering opportunities with academia and industry to seek funding for a longitudinal study to monitor the incidence and cost of pressure ulcers in Victoria.

Position Victoria as a leader in pressure ulcer prevention and management. Recommend to the Australian Commission on Safety and Quality in Health Care or other appropriate national body the use of Victorian PUPPS methodology and results to create a national pressure ulcer prevalence and incidence survey with an associated database of information.

Work with key external organisations

Work with universities to improve undergraduate education in pressure ulcer prevention and management for all health professionals.

Work with the Australian Wound Management Association (AWMA) to raise awareness and disseminate evidence based guidelines for clinical practice in prevention and management of pressure ulcers nationally.

Foster opportunities for skilled clinical staff roles such as nurse practitioner positions in pressure ulcer prevention and management.

Clarify industry standards for high end pressure reducing support surfaces to enable health services to make informed purchases.

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Appendix A — PUPPS 3 Pressure Ulcer Staging System

PUPPS 3—The National Pressure Ulcer Advisory Panel (NPUAP) Pressure Ulcer Staging System

Pressure ulcers are classified by the depth of tissue damage present.

For the purpose of this survey staging of pressure ulcers will be that recommended for use by the Australian Wound Management Association, which is consistent with the recommendations of the National Pressure Ulcer Advisory Panel (NPUAP) U.S.A.

Stage 1

Observable pressure related alteration of intact skin whose indicators as compared to the adjacent or opposite area of the body may include changes in one or more of the following: skin temperature (warmth or coolness), tissue consistency (firm or boggy feel) and/or sensation (pain, itching).

The ulcer appears as a defined area of persistent redness in lightly pigmented skin, whereas in darker skin tones, the ulcer may appear with persistent red, blue or purple hues.



Please note: heel pressure ulcer covered with a film dressing

Stage 2

Partial thickness skin loss involving epidermis and/or dermis. The ulcer is superficial and presents clinically as an abrasion, blister, or shallow crater.



See over for Limitations in Staging System

Stage 3

Full thickness skin loss involving damage or necrosis of subcutaneous tissue that may extend down to but not through underlying fascia. The ulcer presents clinically as a deep crater with or without undermining of adjacent tissue.



Stage 4

Full thickness skin loss with extensive destruction, tissue necrosis or damage to muscle, bone, or supporting structures (for example, tendon or joint capsule). Undermining and sinus tracts may also be associated with Stage 4 pressure ulcers.



Limitations to Staging System

There are limitations to any staging system and the following points should be noted:

1. Reactive hyperaemia may easily be confused with a *Stage 1* pressure ulcer. Reactive hyperaemia is a normal compensatory mechanism following an episode of reduced perfusion from localised pressure. Relief of this pressure results in a large and sudden increase in blood flow to the affected tissue.

NB For the purpose of this survey, patients who are identified as having an area of reactive hyperaemia will need to be repositioned off the affected area; the skin will then need to be re-inspected thirty minutes later for evidence of a Stage 1 pressure ulcer.

2. Identification of *Stage 1* pressure ulcers may be difficult in individuals with darkly pigmented skin.
3. When necrotic tissue (eschar or slough) is present the true extent of tissue damage is masked. Accurate staging of the pressure ulcer is not possible until the necrotic tissue has sloughed or the wound has been debrided. Pressure ulcer staging systems should be used to document the maximum anatomic depth of tissue involved in the ulcer after necrotic tissue has been removed.

NB For the purpose of this study, the presence of necrotic tissue within or covering a pressure ulcer shall automatically indicate that the ulcer will be classified as Stage 4. The presence of dense or deep slough over all or a portion of the ulcer shall also mean that the ulcer will be classified as Stage 4.

4. Staging of healing pressure ulcers (reverse staging) remains controversial (as the healing of a Stage 4 pressure ulcer is not equivalent to a Stage 2 pressure ulcer) but a system may need to be developed for use in management protocols.
5. The NPUAP recommend that the progress of a healing pressure ulcer be documented by objective parameters such as; size, depth, amount of necrotic tissue, amount of exudate and the presence of granulation and epithelial tissue.
6. The staging system depends on visual observation of tissue involvement only. Health care professionals involved in individual care should also note the following factors: location; dimensions or surface area of the wound bed, wound edges and surrounding skin; the amount of exudate; severity of pain; and other factors which may impede wound healing.

Reference: Australian Wound Management Association. Clinical Practice Guidelines for the Prediction and Prevention of Pressure Ulcers. West Leederville, Perth, Australia: Cambridge Publishing, 2001.

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Primary Medical Specialty

Question 7. Choose one “*Primary Medical Specialty*” only.

A list of which specialties fall under each group is listed below.

Paediatric patients should be allocated to their appropriate medical or surgical specialty.

Primary Medical Specialty	Group includes:
Critical Care	Critical Care, Coronary Care, Level 2 Special Care Nurseries, High Dependency & Intensive Care Units (Adult and Neonatal).
Emergency Medicine	Emergency Medicine
Medical	Cardiovascular/Cardiology, Dermatology, Detoxification, Endocrinology, Gastroenterology, General Medical, Geriatric Medicine, Haematology, Hepatobiliary, Immunology, Infectious Diseases, Interim Care, Neonatal, Neurology, Oncology, Paediatric (medical or surgical as appropriate), Renal, Respiratory Medicine, Rheumatology, Stroke, Special Care Nursery
Surgical	Burns, Cardiovascular/Cardiology, Ear Nose & Throat, General Surgical, Gynaecology, Head and neck, Liver transplant, Neurosurgical, Ophthalmology, Oral facio-maxillary, Orthopaedic, Pain Management, Plastic Surgery, Thoracic Surgery, Transplant, Urological & Vascular.
Obstetric	Obstetric
Palliative Care	Palliative Care
Rehabilitation	Rehabilitation
Spinal	Spinal
Other	All other medical specialties

Pressure Relieving/Reducing Devices

Question 13. Types of pressure ulcer devices—you may choose more than one if there are multiple devices insitu.

Pressure Relieving /Reducing Devices	Examples
Comfort &/or Adjunct	Sheepskin, (inc Booties, Heel or Elbow protectors), Pillows, Spenco fibre filled or dermal pads, foam wedges
Cushions & Overlays—STATIC	Foam, Eggshell foam, Gel mats, Static air cushion, Static air overlays
Cushions & Overlays—DYNAMIC	Alternating air cushion, Alternating air overlays such as Alphaxcell
Replacement Mattresses—STATIC	High specification foam, Layered/cubed foam mattresses, Static air replacement mattress
Replacement Mattresses—DYNAMIC	Low air loss mattress such as Therakair, Alternating air replacement mattress
Specialty Beds	Low air loss beds, Air fluidised beds such as Clinitron

Appendix C—Prevalence by health service

Table A1 details the survey population and prevalence by health service.

Table A1. Pressure ulcer prevalence by health service

Health Service	Patient population	Patients refused	Patients seen	Patients with ulcers	Prevalence
2	7	0	7	0	–
6	13	1	12	0	–
31	18	5	13	0	–
46	2	0	2	0	–
49	4	0	4	0	–
51	23	4	19	0	–
53	4	2	2	0	–
58	9	0	9	0	–
60	2	0	2	0	–
65	3	0	3	0	–
68	1	0	1	0	–
73	4	0	4	0	–
81	1	0	1	0	–
82	2	0	2	0	–
84	5	0	5	0	–
86	6	0	6	0	–
15	30	0	30	1	3.3%
9	22	0	22	1	4.5%
12	27	5	22	1	4.5%
57	18	0	18	1	5.6%
85	16	1	15	1	6.7%
75	66	12	54	4	7.4%
18	52	2	50	4	8.0%
66	11	0	11	1	9.1%
80	11	0	11	1	9.1%
33	35	3	32	3	9.4%
64	101	16	85	8	9.4%
32	140	27	113	11	9.7%
20	26	6	20	2	10.0%
25	12	2	10	1	10.0%
69	10	0	10	1	10.0%
8	116	3	113	12	10.6%
44	89	4	85	9	10.6%
29	18	0	18	2	11.1%
52	9	1	8	1	12.5%
56	8	0	8	1	12.5%
45	31	0	31	4	12.9%
3	144	6	138	18	13.0%
26	52	6	46	6	13.0%
72	16	1	15	2	13.3%
42	73	6	67	9	13.4%

Health Service	Patient population	Patients refused	Patients seen	Patients with ulcers	Prevalence
11	57	6	51	7	13.7%
63	128	12	116	16	13.8%
10	24	3	21	3	14.3%
22	22	1	21	3	14.3%
30	7	0	7	1	14.3%
71	946	131	815	122	15.0%
76	22	2	20	3	15.0%
47	663	70	593	92	15.5%
35	54	10	44	7	15.9%
27	80	24	56	9	16.1%
38	368	13	355	59	16.6%
4	18	0	18	3	16.7%
70	6	0	6	1	16.7%
16	430	41	389	66	17.0%
7	218	21	197	34	17.3%
5	574	61	513	92	17.9%
61	15	4	11	2	18.2%
83	26	0	26	5	19.2%
43	230	39	191	38	19.9%
24	12	2	10	2	20.0%
67	5	0	5	1	20.0%
74	6	1	5	1	20.0%
17	602	70	532	108	20.3%
48	28	4	24	5	20.8%
39	36	3	33	7	21.2%
28	459	69	390	86	22.1%
23	66	4	62	14	22.6%
34	22	0	22	5	22.7%
1	528	85	443	101	22.8%
13	85	7	78	19	24.4%
40	431	112	319	78	24.5%
59	4	0	4	1	25.0%
14	381	76	305	80	26.2%
19	63	11	52	14	26.9%
37	25	7	18	5	27.8%
41	11	2	9	3	33.3%
55	14	3	11	4	36.4%
87	10	0	10	4	40.0%
36	9	1	8	4	50.0%
50	4	0	4	2	50.0%
62	6	0	6	3	50.0%
79	11	0	11	6	54.5%
54	1	0	1	1	100.0%
Total	7,944	1,008	6,936	1,222	

Appendix D — Pressure ulcers by DHS comparative group

Table A2. Pressure ulcers by DHS comparative group

Comparative group	Patients with Ulcers	Total number of Ulcers	Ulcers hospital acquired only				Ulcers present on admission only				Ulcers present on admission and hospital acquired						Missing data					
			Patients		Ulcers		Patients		Ulcers		Patients		Ulcers		Patients		Ulcers		Patients		Ulcers	
			%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N
A1	365	650	74.2%	271	72.2%	469	19.7%	72	17.7%	115	5.8%	21	4.9%	32	4.5%	29	0.3%	1	0.8%	5		
A2	284	495	69.0%	196	61.8%	306	22.5%	65	23.0%	114	7.4%	20	7.5%	37	6.9%	34	1.1%	3	0.8%	4		
B	221	371	66.5%	147	63.9%	237	24.4%	54	21.8%	81	8.1%	18	5.9%	22	7.3%	27	0.9%	2	1.1%	4		
C	35	50	65.7%	23	64.0%	32	25.7%	9	24.0%	12	5.7%	2	6.0%	3	4.0%	2	2.9%	1	2.0%	1		
D	48	79	75.0%	36	75.9%	60	20.8%	10	17.7%	14	4.2%	2	3.8%	3	2.5%	2	-	0	-	0		
E&M	34	65	52.9%	18	47.7%	31	38.2%	13	40.0%	26	2.9%	1	3.1%	2	1.5%	1	5.9%	2	7.7%	5		
Z	235	390	57.4%	135	52.8%	206	32.8%	77	30.5%	119	8.9%	21	8.2%	32	7.4%	29	0.9%	2	1.0%	4		
Total	1,222	2,100	67.6%	826	63.9%	1,341	24.5%	299	22.9%	481	7.0%	86	6.2%	131	5.9%	124	0.9%	11	1.1%	23		

Appendix E— Pressure ulcers by medical speciality

Table A3. Pressure ulcers by medical speciality

Medical speciality	Patients with Ulcers		Ulcers hospital acquired only				Ulcers present on admission only				Ulcers present on admission and hospital acquired				Missing data					
	Total number of Ulcers	Patients with Ulcers	Patients		Ulcers		Patients		Ulcers		Patients		Ulcers		Patients		Ulcers			
			%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N		
Critical Care	72	145	87.5%	63	82.1%	119	5.6%	4	5.5%	8	5.6%	4	4.1%	6	4.8%	7	1.4%	1	3.4%	5
Surgical	232	392	81.9%	190	77.0%	302	13.8%	32	14.5%	57	3.9%	9	4.3%	17	3.3%	13	0.4%	1	0.8%	3
Palliative Care	59	104	69.5%	41	72.1%	75	28.8%	17	26.0%	27	1.7%	1	1.0%	1	1.0%	1	-	0	-	0
Medical	569	989	66.6%	379	63.6%	629	25.3%	145	23.1%	228	7.2%	40	6.5%	64	6.1%	60	0.9%	5	0.8%	8
Rehabilitation	264	432	54.2%	143	47.0%	203	34.1%	90	33.6%	145	10.6%	28	9.5%	41	9.0%	39	1.1%	3	0.9%	4
Emergency Medicine	10	15	40.0%	4	40.0%	6	50.0%	5	53.3%	8	-	0	-	0	-	0	10.0%	1	6.7%	1
Spinal	14	20	35.7%	5	30.0%	6	50.0%	7	45.0%	9	14.3%	2	15.0%	3	10.0%	2	-	0	-	0
Obstetric	0	0																		
Other	1	1	100.0%	1	100.0%	1	-	0	-	0	-	0	-	0	-	0	-	0	-	0
Missing data	1	2	-	0	-	0	-	0	-	0	100.0%	1	50.0%	1	50.0%	1	-	0	-	0
Total	1,222	2,100	67.6%	826	63.9%	1,341	24.5%	299	23.0%	482	7.0%	86	6.3%	133	5.9%	123	0.9%	11	1.0%	21

Appendix F— Pressure ulcers by health service

Table A4. Pressure ulcers by health service

Health Service	Patients with Ulcers	Total number of Ulcers	Ulcers hospital acquired only				Ulcers present on admission only				Ulcers present on admission and hospital acquired						Missing data					
			Patients		Ulcers		Patients		Ulcers		Patients		Ulcers		Patients		Ulcers		Patients		Ulcers	
			%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N
27	9	14	100.0%	9	100.0%	14	0	-	0	0	-	0	0	-	0	0	-	0	0	-	0	
37	5	7	100.0%	5	100.0%	7	0	-	0	0	-	0	0	-	0	0	-	0	0	-	0	
55	4	10	100.0%	4	100.0%	10	0	-	0	0	-	0	0	-	0	0	-	0	0	-	0	
75	4	4	100.0%	4	100.0%	4	0	-	0	0	-	0	0	-	0	0	-	0	0	-	0	
10	3	4	100.0%	3	100.0%	4	0	-	0	0	-	0	0	-	0	0	-	0	0	-	0	
33	3	3	100.0%	3	100.0%	3	0	-	0	0	-	0	0	-	0	0	-	0	0	-	0	
20	2	2	100.0%	2	100.0%	2	0	-	0	0	-	0	0	-	0	0	-	0	0	-	0	
24	2	2	100.0%	2	100.0%	2	0	-	0	0	-	0	0	-	0	0	-	0	0	-	0	
61	2	2	100.0%	2	100.0%	2	0	-	0	0	-	0	0	-	0	0	-	0	0	-	0	
9	1	1	100.0%	1	100.0%	1	0	-	0	0	-	0	0	-	0	0	-	0	0	-	0	
12	1	1	100.0%	1	100.0%	1	0	-	0	0	-	0	0	-	0	0	-	0	0	-	0	
15	1	5	100.0%	1	100.0%	5	0	-	0	0	-	0	0	-	0	0	-	0	0	-	0	
25	1	3	100.0%	1	100.0%	3	0	-	0	0	-	0	0	-	0	0	-	0	0	-	0	
56	1	1	100.0%	1	100.0%	1	0	-	0	0	-	0	0	-	0	0	-	0	0	-	0	
57	1	1	100.0%	1	100.0%	1	0	-	0	0	-	0	0	-	0	0	-	0	0	-	0	
66	1	1	100.0%	1	100.0%	1	0	-	0	0	-	0	0	-	0	0	-	0	0	-	0	
69	1	1	100.0%	1	100.0%	1	0	-	0	0	-	0	0	-	0	0	-	0	0	-	0	
80	1	1	100.0%	1	100.0%	1	0	-	0	0	-	0	0	-	0	0	-	0	0	-	0	
8	12	16	91.7%	11	81.3%	13	8.3%	1	18.8%	3	-	0	0	-	0	0	-	0	0	-	0	
63	16	26	87.5%	14	88.5%	23	6.3%	1	3.8%	1	6.3%	1	3.8%	1	3.8%	1	3.8%	1	3.8%	1	3.8%	
64	8	11	87.5%	7	81.8%	9	-	0	-	0	12.5%	1	9.1%	1	9.1%	1	9.1%	1	9.1%	1	9.1%	
39	7	11	85.7%	6	90.9%	10	14.3%	1	9.1%	1	-	0	0	-	0	0	-	0	0	-	0	
3	18	33	83.3%	15	72.7%	24	11.1%	2	18.2%	6	5.6%	1	6.1%	2	6.1%	2	6.1%	2	6.1%	2	6.1%	

32	11	22	81.8%	9	72.7%	16	18.2%	2	27.3%	6	-	0	-	0	-	0	-	0	-	0	-	0	-	0
48	5	7	80.0%	4	71.4%	5	20.0%	1	28.6%	2	-	0	-	0	-	0	-	0	-	0	-	0	-	0
13	19	34	78.9%	15	79.4%	27	15.8%	3	11.8%	4	5.3%	1	5.9%	2	2.9%	1	-	0	-	0	-	0	-	0
19	14	24	78.6%	11	70.8%	17	14.3%	2	20.8%	5	-	0	-	0	-	0	7.1%	1	8.3%	2	-	0	-	0
42	9	17	77.8%	7	88.2%	15	22.2%	2	11.8%	2	-	0	-	0	-	0	-	0	-	0	-	0	-	0
17	108	200	76.9%	83	75.0%	150	16.7%	18	12.5%	25	5.6%	6	4.5%	9	6.0%	12	0.9%	1	2.5%	5	-	0	-	0
36	4	10	75.0%	3	90.0%	9	25.0%	1	10.0%	1	-	0	-	0	-	0	-	0	-	0	-	0	-	0
45	4	9	75.0%	3	77.8%	7	-	0	-	0	25.0%	1	11.1%	1	11.1%	1	-	0	-	0	-	0	-	0
87	4	7	75.0%	3	85.7%	6	25.0%	1	14.3%	1	-	0	-	0	-	0	-	0	-	0	-	0	-	0
71	122	219	73.0%	89	72.6%	159	20.5%	25	17.8%	39	6.6%	8	5.0%	11	4.6%	10	-	-	-	-	-	-	-	-
16	66	129	69.7%	46	69.8%	90	21.2%	14	14.7%	19	9.1%	6	8.5%	11	6.2%	8	-	0	-	0	-	0	-	0
44	9	16	66.7%	6	56.3%	9	33.3%	3	43.8%	7	-	0	-	0	-	0	-	0	-	0	-	0	-	0
79	6	14	66.7%	4	50.0%	7	16.7%	1	28.6%	4	16.7%	1	14.3%	2	7.1%	1	-	0	-	0	-	0	-	0
4	3	3	66.7%	2	66.7%	2	-	0	-	0	-	0	-	0	-	0	33.3%	1	33.3%	1	-	0	-	0
62	3	5	66.7%	2	80.0%	4	33.3%	1	20.0%	1	-	0	-	0	-	0	-	0	-	0	-	0	-	0
76	3	3	66.7%	2	66.7%	2	33.3%	1	33.3%	1	-	0	-	0	-	0	-	0	-	0	-	0	-	0
47	92	151	65.2%	60	62.9%	95	29.3%	27	29.1%	44	4.3%	4	2.6%	4	4.6%	7	1.1%	1	0.7%	1	-	0	-	0
7	34	63	64.7%	22	57.1%	36	20.6%	7	17.5%	11	14.7%	5	9.5%	6	15.9%	10	-	0	-	0	-	0	-	0
23	14	20	64.3%	9	65.0%	13	35.7%	5	35.0%	7	-	0	-	0	-	0	-	0	-	0	-	0	-	0
5	92	167	64.1%	59	53.9%	90	26.1%	24	26.3%	44	7.6%	7	11.4%	19	6.6%	11	2.2%	2	1.8%	3	-	0	-	0
28	86	139	64.0%	55	62.6%	87	30.2%	26	29.5%	41	4.7%	4	3.6%	5	3.6%	5	1.2%	1	0.7%	1	-	0	-	0
14	80	152	62.5%	50	53.3%	81	25.0%	20	25.0%	38	11.3%	9	9.9%	15	11.2%	17	1.3%	1	0.7%	1	-	0	-	0
40	78	140	61.5%	48	55.7%	78	28.2%	22	30.7%	43	10.3%	8	7.9%	11	5.7%	8	-	0	-	0	-	0	-	0
1	101	151	61.4%	62	60.3%	91	32.7%	33	28.5%	43	5.9%	6	6.6%	10	4.6%	7	-	0	-	0	-	0	-	0
34	5	6	60.0%	3	66.7%	4	40.0%	2	33.3%	2	-	0	-	0	-	0	-	0	-	0	-	0	-	0
83	5	9	60.0%	3	55.6%	5	20.0%	1	22.2%	2	-	0	-	0	-	0	20.0%	1	22.2%	2	-	0	-	0
38	59	86	59.3%	35	51.2%	44	30.5%	18	30.2%	26	10.2%	6	8.1%	7	10.5%	9	-	0	-	0	-	0	-	0

43	38	66	57.9%	22	48.5%	32	23.7%	9	22.7%	15	18.4%	7	12.1%	8	16.7%	11	-	0	-	0
35	7	12	57.1%	4	66.7%	8	28.6%	2	16.7%	2	-	0	-	0	-	0	14.3%	1	16.7%	2
26	6	7	50.0%	3	42.9%	3	50.0%	3	57.1%	4	-	0	-	0	-	0	-	0	-	0
50	2	4	50.0%	1	25.0%	1	-	0	-	0	-	0	-	0	-	0	50.0%	1	75.0%	3
72	2	3	50.0%	1	33.3%	1	-	0	-	0	50.0%	1	33.3%	1	33.3%	1	-	0	-	0
41	3	6	33.3%	1	33.3%	2	66.7%	2	66.7%	4	-	0	-	0	-	0	-	0	-	0
11	7	8	28.6%	2	25.0%	2	71.4%	5	75.0%	6	-	0	-	0	-	0	-	0	-	0
18	4	6	25.0%	1	16.7%	1	75.0%	3	83.3%	5	-	0	-	0	-	0	-	0	-	0
22	3	3	-	0	-	0	100.0%	3	100.0%	3	-	0	-	0	-	0	-	0	-	0
29	2	3	-	0	-	0	100.0%	2	100.0%	3	-	0	-	0	-	0	-	0	-	0
30	1	2	-	0	-	0	100.0%	1	100.0%	2	-	0	-	0	-	0	-	0	-	0
52	1	1	-	0	-	0	100.0%	1	100.0%	1	-	0	-	0	-	0	-	0	-	0
54	1	1	-	0	-	0	100.0%	1	100.0%	1	-	0	-	0	-	0	-	0	-	0
59	1	6	-	0	-	0	100.0%	1	100.0%	6	-	0	-	0	-	0	-	0	-	0
67	1	1	-	0	-	0	100.0%	1	100.0%	1	-	0	-	0	-	0	-	0	-	0
70	1	2	-	0	-	0	100.0%	1	100.0%	2	-	0	-	0	-	0	-	0	-	0
74	1	3	-	0	-	0	-	0	-	0	100.0%	1	66.7%	2	33.3%	1	-	0	-	0
85	1	3	-	0	-	0	-	0	-	0	100.0%	1	66.7%	2	33.3%	1	-	0	-	0
Total	1,222	2,100	67.6%	826	63.9%	1,341	24.5%	300	23.0%	484	7.0%	85	6.2%	130	5.9%	124	0.9%	11	1.0%	21

Table A4 is confined to those health services that identified patients with ulcers.

Appendix G—Methodology

Population

All Victorian acute and subacute health services (86 organisations across 136 sites) were invited and 100% of organisations elected to participate in PUPPS 3.

No patient data was submitted by 2 health services, as there were no eligible patients in the facilities on the survey day. This report, unless otherwise stated, contains the analysed data of the remaining 84 health services. Over the survey period, 7,944 Victorian public hospital patients across the state were approached to take part in the survey.

Victorian public acute and sub acute health services vary widely in size, case mix and location. Health service size ranged from 1 campus to 5 and from 4 beds to 1,113. The division according to location was: metropolitan 68%, regional 15% and rural 17% of total beds involved.

Inclusion and exclusion criteria

The criteria for inclusion remained the same as PUPPS 2: all adult, paediatric and neonatal inpatients on site on the day of the survey (including qualified newborns and Emergency Department patients flagged for admission). Psychiatric, unqualified newborns (a newborn accompanying its mother but not admitted as a patient), hospital in the home, day surgery and day procedure patients were excluded.

Minor modifications were made to the PUPPS 2 Survey Tool, shown in full as Appendix B, in the areas of:

- Primary medical specialty choice was simplified to align with the groupings reported in PUPPS 1&2 and additional surveyor instructions included on the reverse side of the tool
- Some clinical and demographic variables were removed which did not provide useful data in PUPPS 1&2
- Data fields were reformatted to reduce data collection to a single sided A4 page.

Education and survey process

Health services were requested to nominate an onsite co-ordinator to work with the project staff to prepare for the survey and to provide clinical staff to act as surveyors.

For PUPPS 3 the VQC PUPPS methodology of “Train, Test & Tabulate” was used. Each surveyor was issued with a ‘Surveyor’s Toolkit’ which contained general information on the survey, pre-reading material with background on pressure ulcers, prevalence surveys and pressure ulcer classification, the survey tool, survey protocol and patient information. A core team of 13 pressure ulcer and wound management experts facilitated education days to train surveyors in a single day program provided at 18 metropolitan and rural locations.

All surveyors undertook interrater reliability testing to improve consistency of data collection. The surveyors were required to write responses to questions regarding staging definitions and then to appropriately stage clinical slides of pressure ulcers. The required pass rate was 85% and surveyors had two formal opportunities to achieve this.

Surveyors were instructed that in the presence of reactive hyperaemia patients should be repositioned off the affected area and re-checked 30 minutes later for evidence of a Stage 1 pressure ulcer. Any ulcer of dubious aetiology and any finding of 5 or more pressure ulcers on one patient was to be discussed and checked with the site coordinator and/or a member of the PUPPS 3 core team.

Survey data was manually counted and a preliminary report on prevalence and severity of pressure ulcers provided to health services within 10 days of their survey.

Contextual information

All health services were asked to respond to a questionnaire with the aim of determining the extent to which the key recommendations from PUPPS 1&2 had been implemented. Contextual information questions were consistent with PUPPS 1&2 with additional questions related to the 3 key recommendations of PUPPS 2, the VQC patient information publications and the State-wide Mattress Replacement Program included. The data was collected using a combination of quantitative and qualitative questions and was completed by the PUPPS 3 site co-ordinators.

Site co-ordinators were employed in a diverse range of roles in their organisations prior to being seconded as the health service liaison for PUPPS 2. Consequently the information obtained for this part of the project should be viewed as containing a degree of subjectivity related to individual impressions and level of organisational responsibility.

Data Analysis

Data was scanned electronically into the character recognition and data software program, TELEForm® Version 8.2, Cardiff Software Inc. Vista, CA USA, 2003.

Data was verified, processed and exported using StatTransfer (CircleSystems Inc, Seattle, WA, 2003) into a Stata database (StataCorp, College Station, TX USA, 2003). Stata 8 was used for all data analysis and reporting.

Data for individual health service and State-wide reports were prepared for using Microsoft Access and Microsoft Excel (2000 Version 9.0.4402 SR-1 Microsoft Corporation, Seattle WA, 2003).

Additional contextual data provided via written responses from individual site co-ordinators of each health service were keyed into a Microsoft Access database (Microsoft Corporation, Seattle WA, 2003).and Stata database (StataCorp, College Station, TX USA, 2003).

All data analysis and reporting was undertaken by the Clinical Epidemiology and Health Services Evaluation Unit, Melbourne Health.

