ORIGINAL ARTICLE



The pressure injury prevalence and practice improvements (PIPPI) study: A multiple methods evaluation of pressure injury prevention practices in an acute-care hospital

Jenny Sim^{1,2} | Valerie Wilson^{3,4} | Karen Tuqiri³

¹School of Nursing, Midwifery & Paramedicine, Faculty of Health Sciences, Australian Catholic University, Sydney, NSW, Australia

²School of Nursing, University of Wollongong, Wollongong, NSW, Australia

³Nursing Services, The Prince of Wales Hospital, Randwick, NSW, Australia

⁴The South Western Sydney Nursing & Midwifery Research Alliance, South Western Sydney Local Health District, Ingham Institute for Applied Medical Research, Liverpool, NSW, Australia

Correspondence

Jenny Sim School of Nursing, Midwifery & Paramedicine, Faculty of Health Sciences, Australian Catholic University, 33 Berry St, North Sydney, NSW 2060, Australia. Email: jenny.sim@acu.edu.au

Funding information University of Wollongong

Abstract

Pressure injuries are a significant problem for immobile patients in acute care and can have a profound impact on patients' health and well-being, putting pressure on healthcare systems and strain on the healthcare economy. Nurses play a pivotal role in preventing pressure injuries. A study using multiple methods was conducted to explore pressure injury prevention practices in four inpatient units within a tertiary-level Australian Hospital. Quantitative and qualitative methods were used to gather data across a 9-month period. Observations, audits, surveys and interviews were used to collect data across five time points. Statistical analysis of the quantitative data was undertaken, and thematic analysis was used to analyse qualitative data. Data were integrated using a realist evaluation framework. Ethical approval for the study was granted. The quantitative results demonstrated significant reductions in pressure injury prevalence from 11.5% at commencement to 4.8% at completion of the study. Hospital-acquired pressure injuries also reduced from 4.6% to 1.9%. These results were achieved even though nursing knowledge and attitudes did not increase during the study period. Three qualitative themes were identified: Making Nursing Care Visible, Understanding the 'Why' and Engagement is Key. This study demonstrates that pressure injuries can be prevented with improvements in nursing care processes. Nurses' knowledge and attitudes towards pressure injury prevention did not change throughout this study and further research is required on how nurses' knowledge and attitudes contribute towards pressure injury prevention practices.

K E Y W O R D S

attitudes, knowledge, pressure injury, prevalence, realist evaluation

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Key Messages

- Pressure injury prevention is a complex intervention performed by nurses during routine care.
- Pressure injuries occur frequently in hospitalised patients. By examining the processes of care nurses use to assess pressure injury risk and implement prevention strategies, improvements can be made in pressure injury prevalence rates.
- Examining nursing care processes related to pressure injury prevention helped make nursing care visible and support improvements in nursing care processes.
- Nurses' knowledge and attitudes towards pressure injury prevention are poor. No improvement was seen in nurses' knowledge and attitudes towards pressure injury prevention in this study. Nurses, Clinical Nurse Educators and Nurse Unit Managers require assistance to design and develop pressure injury prevention education to support a contemporary understanding of pressure injury aetiology and prevention.

1 | INTRODUCTION

Pressure injuries are a significant problem for immobile patients in acute-care hospitals. Approximately 12.9% (95% CI, 9.5%–16.8%) of patients admitted to acute care hospitals in Australia and New Zealand have a pressure injury, and 7.9% (95% CI, 5.7%–10.3%) of all admitted patients develop a pressure injury whilst in hospital.¹ International systematic reviews report similar figures.^{2,3} Pressure injuries can be prevented with high-quality nursing care,⁴ multi-component bundles of care,^{5,6} appropriate equipment⁷ and a concerted focus by the healthcare system on managing immobility.⁸ Nurses play a pivotal role in preventing pressure injuries in hospitalised patients and the development of pressure injuries is considered an indicator of the quality of nursing care.⁹

Pressure injuries are defined as localised damage to the skin or underlying tissue (usually over bony prominences) as a result of pressure or pressure in combination with shear.¹⁰ Pressure injuries are primarily caused by immobility or pressure due to medical devices. Patients describe pressure injuries as causing severe, persistent pain^{11,12} and report that they have a profound impact on their social and emotional well-being and quality of life.^{12,13}

Pressure injuries are classified into six stages based on the severity and depth of tissue loss. The most severe pressure injuries (Stage 3, Stage 4, Unstageable and Deep Tissue Injuries) are considered hospital-acquired complications in Australia,¹⁴ and a sentinel or never event in many other countries.¹⁵ Stage 1 and Stage 2 pressure injuries occur frequently and are often described as superficial.¹ Strategies to prevent pressure injuries are supported by International Practice Guidelines developed by the European Pressure Ulcer Advisory Panel, the National Pressure Injury Advisory Panel (North America) and the Pan Pacific Pressure Injury Alliance.¹⁰ Despite the large body of literature on interventions to prevent pressure injuries, people are still developing pressure injuries in the hospital. Some researchers have identified a trend of reduced numbers of Stage 1 and Stage 2 pressure injuries, but the numbers of severe pressure injuries remain unchanged.^{1,16}

Patients who develop a Stage 1 pressure injury in the hospital have a relative risk of death 4.09 (95% CI 3.72-4.50) times higher than patients who do not develop a hospital-acquired pressure injury (HAPI).¹⁷ The relative risk of death increases to 6.67 (95% CI 5.99-7.42) if a person develops an Unstageable HAPI.¹⁷ HAPI's also lead to a significantly longer stay in the hospital,¹⁸ and higher readmission rates at 30, 90 and 180 days.¹⁷ The costs of caring for patients who develop a pressure injury are high. The estimated costs for managing pressure injuries in the Australian healthcare system in 2020 were \$9.11 billion (Australian dollars) and more than half of this expenditure, \$5.1 billion Australian dollars, relates to HAPI which is considered preventable.¹⁸ Padula and Delarmente¹⁹ estimate the treatment costs of HAPI in the United States in 2016 to be \$26.8 billion (US dollars).

2 | DESIGN

2.1 | Aim

This study aimed to explore pressure injury prevention practices in four wards of one Australian hospital using both quantitative and qualitative methods. The study gathered quantitative data on pressure injury prevalence, nursing care processes and the knowledge and attitudes of nurses towards pressure injury prevention at multiple time points (TPs). Qualitative data were then collected to evaluate the effectiveness of pressure injury prevention practices and evaluate how practice improvements in nursing can be used to prevent pressure injuries in an acute-care hospital setting.

2.2 | Design

In this study, baseline data were collected at the commencement of the project (TP 1), incrementally throughout the project (TPs 2 and 3) and at completion (TP 4). Each TP was approximately 6 weeks apart. Evaluation of

the project occurred at TP 5. Observational methods were used to conduct multiple pressure injury prevalence and processes of care (PIPPOC) audits in four wards of one hospital at TPs 1 and 4. Nurses' knowledge and attitudes towards the prevention of pressure injuries were assessed using a cross-sectional survey at TPs 1 and 4. Action learning cycles were encouraged in each ward at TPs 2 and 3. Nursing staff in participating wards were encouraged to use Plan-Do-Study-Act cycles (Action cycles) to address areas identified for improvement in the study. Snapshot audits of 10 randomised patients (using a random number generator) in each ward were conducted at TPs 2 and 3 to provide data on progress with quality improvement activities. The scheduling and focus of quality improvement activities were led by the key stakeholders and clinical leaders in each ward (Nurse Unit



Manager, Clinical Nurse Educator and Pressure Injury Champion). Semi-structured interviews with these key stakeholders and clinical nurses working in each ward were conducted at the completion of the project (TP 5). Figure 1 provides an overview of study activities.

To evaluate the effectiveness of pressure injury prevention practices in these four wards, this study used a realist evaluation framework.²⁰ Realist evaluation is commonly used to examine complex problems and understand how the environment, culture and context of care impact the intervention and outcome being examined.²¹ Realist evaluation seeks to identify what worked for whom and in what circumstances.²⁰ The quantitative data and qualitative data from this study were synthesised using a realist evaluation framework to evaluate pressure injury prevention activities as this was deemed to be a complex intervention that is influenced by the environment, the culture and the context of care.

3 | METHODS

3.1 | Instruments with validity and reliability

PIPPOC audits were conducted using methods established in the Australian Nursing Outcomes Collaborative.⁴ The pressure injury prevalence data elements were developed from the European Pressure Ulcer Advisory Panel minimum data set,²² and the processes of care data were modified from the New South Wales (NSW) Clinical Excellence Commission Audit tool for Pressure Injury Prevalence.²³ Two trained surveyors were used to collect all PIPPOC data in each ward. One of the surveyors was internal to the ward, and the other was independent to the ward. The independent surveyor participated in all PIPPOC surveys to enhance rigour (including snapshot surveys within Action Cycles). The internal surveyor was a registered nurse who was the Pressure Injury Champion or the Clinical Nurse Educator in the ward being surveyed. All surveyors had to independently diagnose and stage any identified pressure injuries within the data collection tool. Training for pressure injury prevalence surveyors consisted of completing the National Database for Nursing Quality Indicators Pressure Ulcer Training Module (Pressure Injuries and Staging) and successfully completing a quiz on staging of pressure injuries with a 100% pass rate. Data collection used gold standard methods for pressure injury prevalence studies,¹⁰ and were collected in a mobile application on an iPadTM which required surveyors to independently confirm the accuracy of all data.

The PUKAT 2.0²⁴ and the APuP²⁵ instruments were used to assess nurses' knowledge and attitudes towards pressure injury prevention as they have good internal reliability and construct validity and have been used in other international studies.^{26,27} The PUKAT 2.0 is a 26-item survey that includes six subscales (Aetiology, Classification and Observation, Risk Assessment, Nutrition, Prevention of Pressure Injuries and Specific Patient Groups) and tests participant knowledge using multiple choice questions. The APuP is a 13-item survey with five subscales, which assesses attitudes towards pressure injury prevention by asking questions using a 5-point Likert scale about a person's beliefs and behaviours. Some minor modifications to the wording were made to reflect the use of the term pressure injury in Australia rather than pressure ulcer. The PUKAT 2.0 has undergone psychometric analysis and evaluation and has an interclass correlation of between 0.69 and 0.83.^{24,28} The APuP has undergone extensive reliability testing with a Cronbach alpha of 0.79 and an overall intraclass correlation coefficient of 0.88.25

3.2 | Sampling and recruitment

Four wards from one hospital in metropolitan NSW, Australia were included in the study. The wards were chosen by the Director of Nursing & Midwifery and included two surgical wards, one medical ward and a rehabilitation ward. Wards were purposively selected with some wards chosen due to high incidence rates of pressure injuries, and others recognised as having good pressure injury prevention practices and low incidence rates.

3.3 | Population and sample

All patients who were present in the participating wards when prevalence surveys were conducted were invited to participate. All nurses working on participating wards were eligible to participate in the nursing survey and qualitative interviews. Approximately 110 nurses were employed in these wards over this timeframe.

3.4 | Data collection

PIPPOC injury prevalence and processes of care audits were conducted on all patients in each ward at TPs 1 and 4. Data included the presence, severity and location of pressure injuries, including hospital-acquired pressure injuries, and the processes of care used by nurses when planning and implementing pressure injury prevention interventions. Snapshot audits were conducted in four wards at TP 2 and in two of the four wards at TP 3. Data were collected via a mobile application on an iPadTM at all TPs.

Nurses' knowledge and attitudes towards pressure injury prevention were assessed using a cross-sectional survey administered via Survey Monkey[™] at TPs 1 and 4. Surveys were distributed to nurses via email by the research team and potential participants received up to three reminders over a 6-week period. Surveys were also loaded onto the desktop homepage of computers in the clinical setting and nursing staff were encouraged to participate in the research by the Clinical Nurse Educators in each ward.

Pressure Injury Champions, Clinical Nurse Educators and Nurse Unit Managers in each ward were encouraged to disseminate findings at each TP in the study. Action Cycles using the Plan–Do–Study–Act quality improvement methodology were encouraged in each ward at TPs 2 and 3. The project leadership teams in each ward were encouraged to develop a prioritised plan for improving a component of care related to pressure injury prevention at each stage of the project. A reporting framework was developed to support recording of these quality improvement activities.

Qualitative interviews with nursing staff in each ward were conducted at the completion of the project (TP 5) using a semi-structured interview guide (see Supplementary File 1). Individual interviews were conducted with the Pressure Injury Champions, Clinical Nurse Educators and Nurse Unit Managers from each ward. Group interviews with clinical nursing staff in each ward were conducted during the overlap in shift times at afternoon handover. Data were audio recorded and transcribed verbatim for both individual and group interviews.

3.5 | Intervention

There was no structured intervention implemented within this study. Each ward was encouraged to conduct context-specific Plan–Do–Study–Act cycles (Action cycles) following the return of data to wards at timepoints 1, 2 and 3. The scheduling and focus of these quality improvement activities were led by the key stakeholders and clinical leaders in each ward (Nurse Unit Manager, Clinical Nurse Educator and Pressure Injury Champion).

3.6 | Data analysis

Quantitative data were imported into Microsoft Excel for data cleaning and then analysed in SPSS version 28.

Descriptive statistics including frequencies, means and percentages were used to present the data. Chi-square and independent t-tests were used to evaluate differences between groups at different TPs. Qualitative data were analysed using thematic analysis.²⁹ The focus of the qualitative data collection was on evaluating the research project and understanding nurses' engagement with the pressure injury practice improvement programme. A realist evaluation framework was used to identify what worked for whom and in what circumstances,²⁰ so that key learning about practice improvements related to pressure injury prevention could be made. Data from all sources was compared and contrasted to identify possible context, mechanism and outcome (CMO) configurations following the analysis of data from all parts of the study. The CMO configurations were developed by the research team and are presented in the results. The hypotheses that have been generated will require testing in future research.

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3.7 | Ethical considerations

This study was approved by the University of Wollongong Human Research Ethics Committee (HREC 2018/343) and had site-specific approval from the hospital where data were collected. All patients gave verbal consent for participation in the pressure injury prevalence audit. Only employees from the participating hospital had access to patient medical records to record data about the processes of care. Nurses in each participating unit received a Participant Information Sheet about the Nurse Survey and by submitting the survey gave implied consent for data collection. All participants in qualitative interviews completed a written consent form and returned the consent form prior to the commencement of the interview. No identifying details have been used in analysing or reporting the data.

4 | RESULTS

4.1 | Participants

Four wards from one hospital participated in this study. The wards included two surgical wards, a medical ward and one sub-acute ward providing rehabilitation services. A total of 205 patients participated in pressure injury prevalence surveys at TPs 1 and 4. Of these 205 patients, 190 consented to skin inspection (92.7%). An additional 61 patients participated at TPs 2 and 3. A total of 80 nurses completed nurse surveys at TP 1 (Response rate = 72.7%), and 54 at TP 4 (Response rate = 49.0%). Surveys were anonymous. Thirty-five

nurses participated in qualitative interviews, including seven individual nurses and four group interviews with 28 participants.

4.2 | PIPPOC surveys

PIPPOC surveys were conducted at TPs 1 and 4. Table 1 provides a summary of the demographic characteristics of participants. The total number of pressure injuries identified in the PIPPOC survey at TP 1 was 31. This equates to a pressure injury point prevalence of 11.5% (Table 2). At TP 4 the total number of pressure injuries decreased to 10 which equates to a point prevalence of 4.8%. HAPIs were present in 4.6% of patients at TP 1 and reduced to 1.9% at TP 4. The total number of HAPIs also decreased from 8 to 3 over this time frame. Reductions in the pressure injury prevalence rates were statistically significant (p < 0.001). The reduction in HAPI rates was not statistically significant (p = 0.294).

The processes of care used by nurses are documented in Table 3. These include risk assessment and skin inspection on admission to the hospital and on transfer to the ward, use of pressure injury prevention equipment, pressure injury prevention plan adoption and provision of education on pressure injury prevention to patients and/or family members. Improvements in processes varied between wards with changes evident in care processes controlled within the ward setting. such as risk assessment and skin inspection on transfer to the ward, use of pressure relieving devices on bedside chairs and use of repositioning regimes for immobile patients. Notable findings include low rates of screening for risk of PI on admission to the hospital (TP1 average = 46.5%; TP4 average = 34.0%). This contrasts with the completion of risk assessment and skin inspection on transfer into the ward (TP1 average = 94.9%; TP4 average = 96.2%). Improvements were seen in processes of care related to provision of PI education materials to patients/family (TP1 Average = 66.7%; TP4 Average = 46.2%), documentation of repositioning regimes for immobile patients (TP1 Ave = 2.1%; TP4 Ave = 55.7%) and patients with support surface on bed who were at very high/high risk of developing a PI (TP1 Ave = 86.7%; TP4 Ave = 100%). No patients in this study received heel elevators at any TP in any of the participating wards.

Snapshot surveys of 10 patients in each participating unit were also completed at intervals determined by each ward. Data from the snapshot surveys are presented in Supplementary File 2. Two wards completed snapshot audits at both TPs 2 and 3 and two units completed snapshot audits at TP 2 only.

4.3 | Nurses' knowledge towards pressure injury prevention

Nurses' knowledge towards pressure injury prevention were assessed at TPs 1 and 4. The demographic characteristics of participants are summarised in Table 4 and statistically significant differences in age, gender and years of experience on the ward were identified. The mean overall knowledge score at TP 1 was 47.3% (SD = 0.12, range: 16%–72%). The lowest scores were found in the themes of Prevention (34.4%), Classification and Observation (48.6%) and Nutrition (49.0%). The highest score was found in Risk Assessment (82.6%).

At TP 4 the mean overall knowledge scores decreased to 44.3% (SD = 0.12, range: 20%–68%). The Classification and Observation subscale and the Specific Patient Groups subscale were the only areas of knowledge to increase during the study. Prevention remained the lowest subscale at TP 4 with a score of 29.3%. Some variation was seen within wards with scores on some subscales increasing but no ward increased their total PUKAT 2.0 score over the study period. There was a statistically significant reduction in knowledge scores for the Nutrition subscale from 49.0% to 35.3% (p = 0.05) over the study period.

4.4 | Nurses' attitudes towards pressure injury prevention

Nurses' attitudes towards pressure injury prevention were assessed at TPs 1 and 4. The mean attitudes score at TP 1 was 41.8 out of 52 (SD = 4.97, range: 32–52). The mean attitudes score decreased slightly to 41.0 out of 52 (SD = 4.97, range: 32–52) at TP 4. The main driver of this change was a statistically significant reduction in 'Personal competency to prevent pressure injuries' from 9.4 at timepoint 1 to 8.8 at timepoint 4 (p = 0.043). There was a statistically significant increase in 'Impact of pressure injuries' from 8.5 to 9.0 (p = 0.012). There was no statistically significant change in overall attitudes towards pressure injury prevention using the APuP instrument (p = 0.407).

4.5 | Qualitative findings

Interviews were conducted at the completion of the project (TP 5). A total of 35 nurses consented to participate. Seven individual interviews were conducted with Nurse Unit Managers, Clinical Nurse Educators and Pressure Injury Champions from participating wards. Group interviews were conducted with 28 nursing staff in the four different wards. No data were collected on the demographic characteristics of participating nurses.

	TP1					TP4					Comparison b	etweer	groups
	Ward 1 $(n = 24)$	Ward 2 $(n = 22)$	Ward 3 $(n = 28)$	Ward 4 $(n = 25)$	TP1 Average $(n = 99)$	Ward 1 $(n = 28)$	Ward 2 $(n = 23)$	Ward 3 $(n=30)$	Ward 4 $(n = 25)$	TP4 average $(n = 106)$	Chi-Square	df	a
Age (years)	67	76	71	69	70.7	62	72	71	73.9	68.6	59.02	58	0.438
Gender													
Male (%)	46	55	54	52	52	46	26	53	48	44	3.54	7	0.171
Female (%)	50	45	43	48	46	54	74	47	52	56			
Length of stay—Hospital (days)	7.5	9.0	7.0	32.8	14.1	8.0	6.7	7.2	17.2	9.7	41.62	34	0.173
Length of stay—Ward (days)	5.5	4.6	6.6	16.4	8.4	5.4	4.7	5.1	6.8	5.9	27.03	24	0.303
Pressure injury risk status on adr	nission												
Very high	0.0	13.6	17.9	4.0	9.1	0.0	4.3	10.0	12.0	6.6	19.36	9	0.004*
High	12.5	27.3	42.9	40.0	31.3	21.4	0.0	20.0	28.0	17.9			
Medium/moderate	0.0	0.0	14.3	0.0	4.0	0.0	0.0	0.0	0.0	0.0			
Low	29.2	9.1	7.1	8.0	13.1	21.4	17.4	23.3	16.0	19.8			
At risk	29.2	40.9	7.1	16.0	22.2	14.3	39.1	13.3	8.0	17.9			
Not at risk	0.0	0.0	7.1	0.0	2.0	0.0	0.0	0.0	0.0	0.0			
Not completed	29.2	9.1	3.6	32.0	18.2	42.9	39.1	33.3	32.0	37.7			

TABLE 1 Demographic characteristics of patient participants (time points [TPs] 1 and 4).

*Indicates statistical significance <0.05.

	TP1					TP4					groups		
	Ward 1 $(n = 24)$	Ward 2 $(n=22)$	Ward 3 $(n=28)$	Ward 4 $(n = 25)$	TP1 totals $(n = 99)$	Ward 1 $(n = 28)$	Ward 2 $(n=23)$	Ward 3 $(n=30)$	Ward 4 $(n = 25)$	TP4 totals (n = 106)	Value	£	d
No. of patient consenting to skin inspection	22	16	26	23	87	27	22	29	25	103			
Pressure injury prevalence total (% of patients surveyed)	4.6	12.5	19.0	8.7	11.5	0	4.3	6.7	4.0	4.8	16.68	7	<0.001 ^a *
Total stage 1 PIs	0	ю	2	0	Ś	0	0	1	1	2			
Total stage 2 PIs	1	4	8	0	13	0	1	2	0	3			
Total Stage 3 PIs	0	3	0	0	3	0	2	0	0	2			
Total stage 4 PIs	1	0	0	0	1	0	0	0	0	0			
Total unstageable PIs	1	0	0	0	1	0	1	0	1	2			
Total deep tissue injury PIs	б	0	1	4	8	0	1	0	0	1			
Total number of PIs (all stages)	Q	10	11	4	31	0	Ŋ	б	7	10	2.27	195	0.024 ^b *
HAPI prevalence total (% of patients surveyed)	0	4.0	4.0	8.7	4.6	0	0	3.3	4.0	1.9	1.10	1	0.294 ^a
HAPI—Stage 1 PIs	0	2	1	0	3	0	0	1	1	2			
HAPI—Stage 2 PIs	0	0	1	0	1	0	0	0	0	0			
HAPI—Stage 3 PIs	0	0	0	0	0	0	0	0	0	0			
HAPI—Stage 4 PIs	0	0	0	0	0	0	0	0	0	0			
HAPI—Unstageable PIs	0	0	0	0	0	0	0	0	1	1			
HAPI—deep tissue injury PIs	0	0	0	4	4	0	0	0	0	0			
Total number of HAPIs (all stages)	0	7	7	4	8	0	0	1	7	ç	1.26	193	0.208 ^b

Pressure injury prevalence data (time points [TPs] 1 and 4). TABLE 2

^aUsing Chi-square test.

^bIndependent T-test. *Indicates statistical significance <0.05.

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	TP1					TP4				
	Ward 1 (%) (<i>n</i> = 24)	Ward 2 (%) (n = 22)	Ward 3 (%) $(n = 28)$	Ward 4 (%) (<i>n</i> = 25)	TP1 (%) Average $(n = 99)$	Ward 1 (%) (n = 28)	Ward 2 (%) (<i>n</i> = 23)	Ward 3 (%) $(n = 30)$	Ward 4 (%) $(n = 25)$	TP4 (%) Average (n = 106)
Documented screening for risk of PI on admission	20.8	68.2	28.6	72.0	46.5	28.6	43.5	30.0	36.0	34.0
Risk assessment documented within 8 h	16.7	40.9	46.4	12.0	29.3	32.1	30.4	26.7	40.0	32.1
Risk assessment documented within 24 h	45.8	90.9	92.9	56.0	71.7	57.1	60.8	66.7	64.0	62.2
Skin assessment documented with 8 h	28.0	59.9	64.3	8.0	40.3	46.4	52.2	33.3	48.0	44.3
Skin assessment documented with 24 h	44.0	95.5	85.7	76.0	75.3	75.0	73.9	76.7	72.0	74.5
Risk and skin assessment documented on transfer to the ward	91.7	95.5	96.2	96.0	94.9	92.9	91.3	100	100	96.2
Comprehensive risk and skin assessment documented on most recent 3 days	54.2	81.8	65.4	80.0	71.7	92.9	82.6	73.3	88.0	84.0
Evidence of PI prevention education provided to patient/ family	100	9.09	64.3	16.0	66.7	100	95.7	50.0	68.0	77.4
Repositioning regime documented (when the patient is immobile)	0	0	0	8.3	2.1	87.5	66.7	50.0	16.7	55.7
Percentage of patients with pressure relieving devices on bed	25.0	50.0	32.1	60.0	41.4	42.9	47.8	33.3	64.0	46.2
Percentage of patients with pressure relieving devices on chair	16.7	18.2	17.9	44.0	24.3	32.1	8.7	26.7	44.0	28.3
Percentage of patients with heel elevators	0	0	0	0	0	0	0	0	0	0
Percentage of patients very high/high risk with pressure relieving device on bed	100	100	52.9	100	86.7	100	100	100	100	100

TABLE 3 Processes of care data (time points [TPs] 1 and 4).

174243 K, 2024, 10, Downloaded from https://onlinelibtrary.wiley.com/doi/10.1111/i/wj.70050 by Australian Catholic University. Wiley Online Library on [06/05/2025]. See the Terms and Conditions (https://onlinelibtrary.wiley.com/terms-and-conditions) on Wiley Online Library for loss of use: O A articles are governed by the applicable Creative Common License

Thematic analysis was used to identify potential context-mechanism-outcome configurations in keeping with the use of a realist evaluation framework.²⁰ The findings are presented in three themes: Making nursing care visible; Understanding the 'why'; and Engagement is key. The themes sought to elucidate the logic behind how practice improvement projects can be used to improve pressure injury prevention in healthcare settings. Qualitative data from participants as well as findings from the empirical component of the study support the three context-mechanism-outcome configurations that were synthesised following data analysis.

4.5.1 | Making nursing care visible

Nurse participation in the PIPPOC audits at multiple TPs enhanced the focus nurses had on their own individual actions for preventing pressure injuries. A nurse stated '... more people are aware of, and I guess accountable to, the pressure injury inspections because of it [the PIPPI project]' (Interview 3—Group). Role modelling and informal conversations appeared to play a role in this process, 'I'm writing a lot more in the notes, I'm telling other staff members about repositioning, things like that ...' (Interview 4—Individual). Clinical nursing staff were impacted by these conversations, and this influenced the care they provided. 'I feel like it being discussed though makes you think about pressure areas a bit more, like obviously when it's highlighted, your kind of like "oh I do need to...", it makes you think' (Interview 7—Group).

This process of drawing attention to pressure injury prevention processes as part of nursing work was a key component of the effectiveness of the study. 'It brought more people, like more of the staff to see what we were doing and made them sort of do repositioning more often' (Interview 4—Individual). Nursing staff commented on how the project had increased the focus on pressure injury prevention processes in their ward. 'I guess with us it's just making sure that we actually do the skin inspections especially when the patients get admitted' (Interview 8—Individual). One Nurse Unit Manager commented on the impact the project had on care processes including education of patients about pressure injury prevention and the provision of equipment.

> 'I think the patient was more involved, well, according to the documentation there's a lot more involvement with the patient. And we've gotten back to ordering the chair cushions again which we were lagging at the start of the project'.

> > (Interview 6—Individual)

Despite improvements in nursing care processes an overt focus on documentation was seen in responses by some participants. One nurse shared their view that the PIPPI project was focused on, '... just making sure your documentation was up to date' (Interview 9—Group).

One of the characteristics of the study was the rapid reporting of PIPPOC data back to each unit. This appeared to assist staff in engaging in the project. 'We got the information we required quick in a timely manner' (Interview 2—Individual). Despite the rapid turn-around of data, the timing of the project and the time between key study activities was a concern for many participants. Most key stakeholders identified that more time was needed between action learning sets.

'What didn't work was the time. It's not enough time for us to do anything between ...'.

(Interview 10-Individual)

'The timeframe wasn't enough for our action plan. We had a lot of things going on at that time'.

(Interview 6-Individual)

The synthesis of the qualitative data and the quantitative data enabled the development of the context-mechanism-outcome configuration presented in Box 1.

BOX 1 Context-Mechanism-Outcome (CMO) configuration 1

CMO1: Making nursing care visible

Context: Nursing care to prevent pressure injuries was part of routine care tasks and was invisible. Nursing care was focused on the documentation of risk rather than preventing pressure injuries.

Mechanism: The collection of data made the nursing care processes for preventing pressure injuries more visible.

Outcome: Linkages between care processes and the prevention of pressure injuries led to a reduction in hospital-acquired pressure injuries and improved pressure injury prevention practices.

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	etween	d			0.008 ^a *							0.007 ^a *								0.067 ^a	0.048 ^a *							ontinues)	
	d nosi	df			131							132								131	130							(C	
	Compar groups	t			2.71							2.53								1.84	1.99								
		Total $(n = 54)$			19	20	10	2	2	1		27.8	72.2		4	13	35	1	1	7.6	3.4		26	20	9	1	1		
		Ward 4 $(n = 16)$			5	9	З	2	0			12.5	87.5		ю	ю	6	0	1	9.2	2.3		S,	8	2	0	1		
		Ward 3 $(n=6)$			2	2	1	0	1			16.7	83.3		0	1	4	1	0	9.6	4.3		5	1	0	0	0		
		Ward 2 $(n = 17)$			5	9	4	0	1	1		35.3	64.7		0	4	13	0	0	7.5	4.1		8	7	2	0	0		
·	TP 4	Ward 1 $(n = 15)$			7	6	2	0	0			40.0	60.0		1	5	6	0	0	5.1	3.2		8	4	2	1	0		
[~ • •]		Total $(n = 80)$			14	33	14	12	7			10.0	0.06		9	17	46	×	3	10.6	5.2		46	24	6	0	1		
		Ward 4 $(n = 24)$			4	6	7	3	1			0	100		S	3	12	3	1	10.4	3.2		13	10	1	0	0		
and function as		Ward 3 $n = 16$ (1	9	1	5	3			6.3	3.7		0	4	1	0	1	4.3	4.6		2	3	1	0	0		
man diama		Vard 2 V n = 22) (8	9	5	2	1			2.7	7.3 9		0	7	2 1	5	0	9.2 1	6.0		0 1	9	9	0	0		
	P 1	Vard 1 V $n = 18$) (1	2	1	2	2			1.1 2	8.9 7		1	3	1 1	2	1	9.1	7.2		1 1	5	1	0	1		
	T		uphic characteristics		4	34 1.	44	54	54	sing	ır	e (%) 1	ıale (%) 8.	u	istant in nursing	olled nurse	istered nurse 1.	uical nurse Specialist/ ical Nurse educator	se unit manager	nursing experience	on ward	yment status	nanent full time 1.	nanent part time	iporary full time	iporary part time	ual		
			Demogr	Age	18-2	25-3	35	45-	55-(Mis.	Gende	Mal	Fen	Positic	ASSI	Enr	Reg	Clir clin	Nur	Years	Years	Emplc	Pen	Pen	Ten	Ten	Cas		

TABLE 4 Nurses' knowledge and attitudes towards pressure injury prevention (time points [TPs] 1 and 4).

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	TP 1					TP 4					Compai groups	rison b	etween
	Ward 1 $(n = 18)$	Ward 2 $(n = 22)$	Ward 3 $(n=16)$	Ward 4 $(n = 24)$	Total $(n = 80)$	Ward 1 $(n = 15)$	Ward 2 $(n = 17)$	Ward 3 $(n=6)$	Ward 4 $(n = 16)$	Total (n = 54)	t	đf	d
Highest qualification													
Certificate/diploma	5	10	5	13	33	7	4	1	4	16			
Bachelors	8	7	7	7	29	7	11	З	7	28			
Post graduate	S	S.	4	4	18	1	2	2	S	10			
Knowledge													
Subscale 1: Aetiology (6 Qs) (% correct [SD])	50.1	55.6	50.0	49.3	51.5 (0.22)	55.6	43.8	44.4	46.9	48.1 (0.18)	0.93	130	0.353 ^a
Subscale 2: Classification & Observation (4 Qs) (% correct [SD])	56.9	50.0	47.9	41.3	48.6 (0.25)	71.7	48.2	41.7	50.0	54.9 (0.30)	-1.28	122	0.202 ^a
Subscale 3: Risk Assessment (2 Qs) (% correct [SD])	77.8	82.5	72.7	91.3	82.6 (0.27)	76.7	75.0	66.7	84.4	77.5 (0.32)	0.975	121	0.332 ^a
Subscale 4: Nutrition (3 Qs) (% correct [SD])	51.9	31.7	60.6	56.5	49.1 (0.26)	37.8	31.0	33.3	37.5	35.3 (0.26)	2.87	121	0.005 ^a *
Subscale 5: Prevention of PIs (8 Qs) (% correct [SD])	38.2	24.4	38.6	27.7	34.4 (0.16)	30.8	27.0	35.4	27.5	29.3 (0.13)	1.85	119	0.067 ^a
Subscale 6: Specific Patient Groups (2 Qs) (% correct [SD])	52.8	80.0	31.8	52.2	56.9 (0.39)	56.7	69.2	33.3	56.7	57.1 (0.40)	-0.27	119	0.978 ^a
PUKAT 2.0 total score (% correct [SD])	51.1	47.4	50.2	46.1	48.3 (0.12)	49.9	40.9	40.7	43.2	44.3 (0.12)	1.80	119	0.075 ^a
Attitudes													
Personal competency to prevent PIs (3 items) (Mean [SD])	9.7	9.5	9.2	9.3	9.4 (1.19)	9.5	7.6	9.2	9.3	8.9 (1.57)	2.05	114	0.043 ^a *
Priority of PI prevention (3 items) (Mean [SD])	10.7	10.4	10.4	10.3	10.4(1.54)	10.1	10.5	9.7	10.1	$10.1\ (1.54)$	1.02	114	0.312 ^a
Impact of PIs (3 items) (Mean [SD])	8.7	8.5	8.2	8.5	8.5 (0.78)	9.0	8.8	0.6	9.3	9.0 (1.47)	-2.55	111	0.012 ^a *
Responsibility in PI prevention (2 items) (Mean [SD])	7.2	7.1	6.7	6.5)	6.9 (1.19)	6.7	7.0	6.8	6.7	6.8 (1.02)	0.45	113	0.657 ^a

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	TP 1					TP 4					Compai groups	ison b	etween
	Ward 1 $(n = 18)$	Ward 2 $(n = 22)$	Ward 3 $(n = 16)$	Ward 4 $(n = 24)$	Total $(n = 80)$	Ward 1 $(n = 15)$	Ward 2 $(n = 17)$	Ward 3 $(n=6)$	Ward 4 $(n = 16)$	Total $(n = 54)$	t	df	d
Confidence in the effectiveness of prevention (2 items) (Mean [SD])	6.9	6.3	6.3	6.5	6.5 (1.11)	6.5	5.8	6.3	6.3	6.2 (0.88)	1.48	114	0.142 ^a
APuP total score (Mean [SD])	41.4 (3.7)	40.8 (4.8)	39.4 (3.8)	39.7 (6.0)	41.8 (4.34)	41.9 (5.2)	40.0 (4.0)	38.5 (4.7)	41.8 (5.7)	41.0 (4.97)	0.83	107	0.407 ^a
^a Using independent <i>T</i> -test. ∗Indicates statistical significance <0.0	5.												

4.5.2 | Understanding the 'why'

The need for focused education on pressure injury prevention was highlighted by most participants with many indicating that this knowledge was pivotal for preventing pressure injuries. Many participants indicated that they were motivated to learn more about pressure injury prevention but were disappointed when this did not eventuate within the study.

> 'The survey was good, but we were really anxious about, like excited to know the answer, but we didn't get the answers'.

(Interview 7-Group)

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'I think if we had some education between our first survey that we did and then our second survey, it probably would have made a bit of a difference'.

(Interview 3-Group)

One Clinical Nurse Educator stated, 'Other than the survey there wasn't a lot of education behind it or anything like that. I didn't increase any education [on pressure injuries] or anything like that' (Interview 2—Individual). This was a missed opportunity as helping nurses to understand the 'why' and the 'how' of pressure injury prevention may lead to sustainable practice change.

Even though nursing care practices improved, and pressure injuries were reduced, nursing knowledge towards pressure injury prevention decreased during the study period. This finding seemed paradoxical, but most likely related to how ward action plans were developed by key stakeholders in each ward based on local requirements for preventing pressure injuries. The research team did not guide the development of ward action plans or how they were implemented. Therefore, education packages were not explicitly included as the research sought to understand existing practices and enable each ward to tailor their action plans to their own needs. Qualitative feedback highlighted the need for education to be included in the project and suggested that the research team should be involved in these processes. 'I think if we were to do a similar research project again ... the person who does the surveys perhaps then develops the action plan' (Interview 10-Individual).

The PUKAT 2.0 survey was used to assess knowledge about pressure injury prevention in this study. Some participants expressed frustration that they didn't get feedback on the nursing survey as part of the project. 'We don't really have the answers, so we don't know if we were right or wrong' (Interview 3—Group). The survey was also described as long and complex by some participants and suggestions for changes in framing and format were provided.

'I think the original survey was way too lengthy. If you want accurate data, I believe it needs to be a bit shorter'.

(Interview 1-Individual)

'A lot of the questions could have had multiple answers, but I think it was more the framing of the questions for our staff. I found it interesting, and it did get them thinking. The staff were thinking and talking about it, which was good to see them interested in that ...'.

(Interview 6—Individual)

One participant was more positive and expressed the potential benefits of assessing knowledge. 'It shows you how much you don't know and how much you do know ... sort of flags stuff that you sort of need to educate yourself on' (Interview 3—Group).

There was no evidence from participants that inservice education activities were completed as part of action plans. Improvement activities that were undertaken in the wards, either as part of recorded action plans or undocumented education, appeared to be focused on compliance with documentation including completing risk assessments and skin inspections within 8 h of transfer to the ward. 'It definitely got us ... documenting a lot better now. Not as best as we could but I'm seeing a big improvement in things' (Interview 6—Individual).

The qualitative data and the quantitative data have been synthesised in the context–mechanism–outcome configuration presented in Box 2.

4.5.3 | Engagement is key

Qualitative data identified that the participation of clinical nurses in the project was minimal and approximately half the nursing staff were not actively engaged in the project. 'Half the staff in this room didn't know about it ... there was no feedback throughout it, there was no real education' (Interview 11—Group). Many nurses were aware of the project but had no detailed knowledge of the findings from different components of the project and no or minimal knowledge of action plans or improvements that occurred because of participation in the project. It was evident, therefore, that reporting from the project was not disseminated back into the clinical units and clinical nurses were not engaged in understanding the findings from their units and collaborating on how pressure injuries could be prevented.

BOX 2 Context–Mechanism–Outcome (CMO) configuration 2

CMO2: Understanding the 'why'

Context: Nurses participated in the project and improved care processes, but individual nurses were not engaged in understanding why the practice change was required.

Mechanism: The focus on improving compliance with documentation was led at the ward level and was not linked to why the practice change was required.

Outcome: There were no changes seen in nurses' knowledge or attitudes towards PI prevention. Nurses require education about what causes pressure injuries and how they can be prevented.

The key stakeholders in each ward also had varying levels of engagement in the project. This may have been related to how wards were selected to participate in the project or the busyness of the clinical environment and the time of year when the research activities were conducted (August 2018–April 2019).

'Timing is very important. That way you get people, you know, people want to do it, it's just the timing'.

(Interview 1—Individual)

'So there was a lot of competing priorities, we couldn't put it up front and centre like you would like it to be. So, progress wise, probably hasn't been as good as it could have been ...'

(Interview 6-Individual)

The findings from the quantitative and qualitative data highlight the importance of the engagement of clinicians and key stakeholders in pressure injury prevention practices and process improvements for sustainable practice change. Box 3 describes the third context–mechanism–outcome configuration that explores the importance of engagement.

5 | DISCUSSION

Our findings show that pressure injuries can be prevented with improvements in nursing care processes.

BOX 3 Context-Mechanism-Outcome (CMO) configuration 3

CMO 3: Engagement is key

Context: Leadership teams in each ward were nominated to be involved in the project and had varied levels of commitment and engagement.

Mechanism: Enhanced involvement of clinical nurses was associated with improved outcomes at the ward level.

Outcome: To ensure sustainable practice change, nurses must be engaged with why pressure injury prevention practices are important and how nursing care can be used to improve outcomes.

BOX 4 Hypotheses generated from this study

Hypothesis 1: Capturing data on pressure injury prevalence and processes of care enables clinical nurses to gain insight into, and make visible, their nursing care practices related to pressure injury prevention. Enhancing the visibility of risk assessment processes, the importance of regular skin assessment, repositioning regimes and the use of pressure relieving equipment can lead to practice improvements and reduced pressure injuries.

Hypothesis 2: A focus on documentation of care processes will not result in improvements in knowledge or attitudes towards pressure injury prevention. Education about why practice changes are required must be factored into strategies to improve pressure injury prevention practices.

Hypothesis 3: Transformation of practice requires active participation and clinical leadership of nurses to champion change and facilitate practice improvements at the ward level.

Nurses' knowledge about preventing pressure injuries was low and did not improve throughout the study. The findings from this study have implications for practice improvements in acute-care settings and have facilitated the development of three hypotheses for testing in future research (see Box 4).

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Data collection procedures at all TPs throughout the study facilitated feedback on nursing actions related to pressure injury prevention. Most of the activities implemented within ward-based improvement plans focused on improving care processes related to risk assessment and skin inspections on arrival to the ward, education of patients about pressure injuries, ensuring the provision of appropriate equipment for high-risk patients and developing repositioning regimes for high-risk, immobile patients. These actions are consistent with studies that focus on the implementation of a pressure injury prevention bundle.^{30–32} The Australian Commission on Safety and Quality in Health Care requires hospitals to meet requirements for comprehensive care in the National Standards for Accreditation of Health Care Services.³³ This study led to some improvements in nursing care practices at the ward level. However, no changes were seen in risk screening for pressure injury prevention on admission as these activities primarily occurred in other areas of the hospital (e.g., emergency department or preadmission department for patients undergoing surgical procedures). Further research and practice change is needed to support improvements in risk screening of patients on admission to acute-care hospitals so that effective risk mitigation strategies are implemented in a timely way in all settings where patients are admitted.

Nursing care for pressure injury prevention is supported by standards, clinical practice guidelines and policy requirements. The actual care provided to patients may deviate from these processes and when this occurs it could be considered unwarranted clinical variation.¹⁵ Deviations may relate to the standards of care in the ward, the model of care used in practice, the staff available to deliver care, staff knowledge about effective care interventions and how care is planned and documented.^{34–36} The wards participating in this project used a combination of paper forms available at the bedside with documents in the electronic medical record to plan for the care required and document what care was delivered. This included a re-assessment of pressure injury risk each shift and documentation of the condition of a patient's skin daily. Frequently this documentation used a tick-box approach. That is, the outcome of the care was not documented but rather the nurses ticked a box if they had completed it. Others have identified deficits in nursing care when tick-box documentation is used to record assessments.³⁷ When this type of approach is used the focus moves from being outcomes-focused to being task-focused and this has implications for the quality of patient care.^{38,39} One area of concern in this study was that no patients received heel elevation for off-loading pressure on the heels. Heels are the second most common location for pressure injuries^{1,40} and heel elevators/

boots⁴¹ and prophylactic dressings⁴² have been effective in reducing heel pressure injuries in some settings. Further research is needed to understand the barriers to providing evidence-based care interventions such as heel elevators in acute-care hospital settings.

Despite an overt focus in this study on measuring nurses' knowledge and attitudes towards pressure injury prevention, no improvement in knowledge or attitudes occurred over the course of the project. The leadership teams in each ward were responsible for developing the action plans for their ward. Because no educational programmes such as in-service education were delivered over this time frame the opportunity to support knowledge improvement was missed. Education on practice is an important part of knowledge translation and is pivotal to supporting nurses to change their practices.⁴³ Neither the pressure injury champion nor the clinical nurse educator in participating wards delivered education to address knowledge deficits in pressure injury prevention. It is clear, therefore that nurses in this study have significant knowledge deficits related to pressure injury prevention. Access to expert knowledge and support for education has previously been recognised as a key component of effective interventions to prevent pressure injuries in critical care settings.5 Access to education to support practice change is also a key characteristic in research evaluating the INTACT pressure injury prevention care bundle.⁶ A process evaluation of the implementation strategies used in the INTACT trial also supports this assertion.³¹

Understanding why care is not delivered in the way required is important for sustainable practice change.⁴⁴ The findings in this study suggest that nurses have a poor knowledge base on how to prevent pressure injuries. This has also been identified in other studies.^{5,45,46} It is, therefore, important that nurses have contemporary knowledge of the aetiology and development of pressure injuries and how evidence-based care processes can be used to prevent pressure injuries. Additional education programmes in formats that support deep learning are required to ensure all clinical nurses have contemporary knowledge on preventing pressure injuries. Mandatory training on risk assessment and classification of pressure injuries does not translate to understanding why pressure injuries occur and how to prevent them. Nursing education therefore needs to embrace the new knowledge available on the aetiology⁴⁷ and development of pressure injuries⁴⁸ that has developed over the last decade and is evidenced in the International Clinical Practice Guideline.¹⁰

Four different wards in the one hospital participated in this study. The realist evaluation framework sought to explore the internal processes in each ward in relation to the engagement and participation of nurses in the project. Based on feedback from clinical nurses in qualitative interviews it was apparent that nurses were only minimally involved in the processes for data collection and had minimal or no knowledge of practice improvements that were implemented because of feedback of data in each unit. Despite this, pressure injury prevalence rates improved throughout the study. Future research should test the hypotheses generated in this research (see Box 4).

5.1 | Limitations

This study was conducted in four wards at one hospital in NSW Australia and translation of the findings to other locations and settings should use caution. The timing of the study was identified as a limitation by participants. The study was conducted over 9 months in 2018/2019 and the action learning cycles were approximately 6 weeks apart and were completed prior to the end of December 2018. This timeframe was considered too short by some study participants and future research should evaluate the length of action cycles to promote wardbased quality improvement activities.

5.2 | Recommendations for further research

Future research is required to evaluate the hypotheses generated in this study. Future research should include multi-hospital studies that recruit a broader cross-section of wards. Consideration should also be given to supporting nursing staff to develop contemporary knowledge on the aetiology of pressure injuries and evidence-based pressure injury prevention strategies based on the International Practice Guidelines for the prevention and treatment of pressure injuries.¹⁰ Nurses' knowledge and use of Plan–Do–Study–Act cycles as a method for quality improvement requires further evaluation and review. Guidance from experienced pressure injury experts and quality improvement professionals is required to support local practice change which is sustainable and embedded in daily nursing care practice.

6 | CONCLUSION

The study was conducted using both quantitative and qualitative methods using a realist evaluation framework and collected data on pressure injury prevalence and processes of nursing care, and nurses' knowledge and attitudes towards pressure injury prevention, at multiple TPs. Pressure injury prevention is a complex healthcare intervention, and the use of realist evaluation has enabled this phenomenon to be studied from multiple perspectives and in significant depth. Our findings show that pressure injuries were reduced over the course of the study, but this was not because nurses' knowledge or attitudes towards pressure injuries improved. Making nursing care processes visible through auditing and sharing the findings helps to make routine nursing care visible and prioritises the importance of essential pressure injury prevention tasks. Future research is required to evaluate the hypotheses generated in the realist evaluation framework component of this study.

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

ORCID

Jenny Sim [©] https://orcid.org/0000-0001-6863-0541 Valerie Wilson [©] https://orcid.org/0000-0001-7138-5591 Karen Tuqiri [©] https://orcid.org/0000-0001-8977-6363

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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