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# Assessing the Effectiveness of Prophylactic Dressings in Reducing Hospital-acquired Pressure Injuries in Intensive Care Units at Selected Hospitals

S. Hema Malini[1,*], N. Anantha Lakshmi[2], R. Monisha[3], Rohini Sharma[4]

***Abstract***

*Patients face a risk of pressure injuries when mobility is restricted and they experience reduced circulation or delicate skin. Factors such as alterations in cognitive function, bowel and bladder functionality, and inadequate intake of nutrients and fluids can contribute to the formation of pressure injuries. In 2016, there were 836.9 hospitalizations related to pressure injuries per 100,000 adults aged 65 years and older worldwide. The objectives of this study are to evaluate the effectiveness of prophylactic sacral dressing on the reduction of hospital-acquired pressure injury among patients in the intensive care unit. The study employed a quantitative approach with a quasi-experimental design, specifically utilizing a one-group pretest and posttest design. During admission, a Braden scale assessment was done by the nurses to identify patients who filled the inclusion criteria and selected 30 samples using the nonprobability purposive sampling technique. Patients whose Braden score is 18 or less will be considered as samples for the study and will apply the Allevyn prophylactic dressing. Data was collected and analyzed. It reveals that the mean value of the pretest was 14.07, whereas the mean value of the posttest was 20.80. The overall mean difference was 6.73. This difference is large and reveals that prophylactic dressing reduces the hospital-acquired pressure injury . Therefore, the data indicates the efficacy of Prophylactic dressing in reducing hospital-acquired pressure injury . This study demonstrates high significance at the $p \leq 0.001$ level.*

**Keywords:** Hospital-acquired pressure injury, prophylactic dressing, intensive care units, HAPI, Allevyn

## INTRODUCTION

Patients face the risk of developing pressure injuries when mobility is restricted, circulation is diminished, or the skin is fragile. Factors such as changes in cognitive function, bowel and bladder function, and inadequate intake of nutrients and fluids can contribute to the occurrence of pressure injuries. Hospitalized patients may have various tubes, drains, and healthcare equipment that pose a risk of pressure injuries. All healthcare providers receive training in pressure injury prevention, employing techniques like proper skin care, regular repositioning of patients in bed, and the use of cushions, mattresses, and devices to reduce pressure. Managing pressure injuries presents a challenge for healthcare providers across disciplines, impacting emotional and physical well-being, quality of life, and healthcare costs. A Cochrane review from 2013 highlighted a lack of high-level evidence supporting the prophylactic use of dressings for preventing pressure injuries.

***Author for Correspondence**
S. Hema Malini
E-mail: nurseeducatoromr_cni@apollohospitals.com

[1]Nurse Educator, Department of Nursing, Apollo Specialty Hospitals–OMR, Chennai, Tamil Nadu, India
[2]Assistant Nursing Superintendent, Department of Nursing, Apollo Specialty Hospitals–OMR, Chennai, Tamil Nadu, India
[3]Staff Nurse, Department of Nursing, Apollo Specialty Hospitals–OMR, Chennai, Tamil Nadu, India
[4]Vice Principal, Department of Nursing, Indraprastha Apollo Hospital, Delhi, India

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This study aimed to assess the efficacy of prophylactic dressings in reducing hospital-acquired pressure injuries (HAPI) in intensive care unit (ICU) patients [1, 2].

**Background of the Study**

- Patients in intensive care units often experience restricted mobility due to factors like hemodynamic instability and prescribed bed rest. The severity of their medical condition, which may involve intubation, sedation, paralysis, surgical procedures, poor nutrition, low flow states, and compromised circulation, necessitates bed rest. These individuals face an increased risk of developing or worsening pressure ulcers (PU), not only due to their underlying health conditions but also because of limited mobility and weakened states of health.
- In 2016, there were 836.9 hospitalizations per 100,000 adults aged 65 years and older worldwide related to pressure injuries.

**OBJECTIVE OF THE STUDY**

To evaluate the effectiveness of prophylactic sacral dressing on the reduction of HAPI among patients in ICU.

**HYPOTHESIS**

- H0: There is no significant effectiveness of prophylactic dressing on the prevention of HAPI among patients in ICU.
- H1: There is a significant effectiveness of prophylactic dressing in the prevention of HAPI among patients in ICU.

**METHODOLOGY**

**Research Approach**

Quantitative approach

**Research Design**

Quasi-experimental design: One-group pretest and posttest design.

**Variables Used**

- Research variable: Prophylactic dressing
- Dependent variable: HAPI

**Settings of the Study**

ICUs and trauma wards in Apollo Speciality Hospitals, OMR.

**Duration of the Study**

A total of 4 weeks (minimum 7 days need to assess each patient).

**Data Collection Method**

- During admission, a Braden scale assessment is done by the nurses.
- To identify the patients who filled the inclusion criteria and select 30 samples using the nonprobability purposive sampling technique, explain the purpose of the study, and get consent from all the study participants or the patient attendees.
- Patients whose Braden score is 18 or less will be considered as samples for the study and will apply the Allevyn prophylactic dressing.
- The data collected for 4 weeks.

**Target Population**

The risk score is 18 or less in the intensive care unit and trauma ward.

 

**Sample Size**

A total of 30 samples.

**Sampling Method**

Non-probability purpose sampling technique.

**Inclusion Criteria**

- Patients in CCU, MDCCU, MICU, SICU, CT-ICU, daycare, and trauma ward.
- The risk score is 18 or less.
- Available at the time of data collection.

**Exclusion Criteria**

- Patients who are not willing to participate in the study.
- Patients in NICU/PICU
- Clinically stable patients/Braden score is more than 18.

**Ethical Considerations**

Ethical clearance was received from the Institutional Ethics Committee, Biomedical Research, Apollo Hospitals, Chennai, on 28th September 2023.

## TOOL USED FOR DATA COLLECTION

**Section A**

Demographic variables like age, gender, education, occupation, income, hospitalization days, comorbidities, and diagnosis (Table 1).

**Section B**

The Braden scale assesses a patient's risk of developing a PU by examining six criteria.

**Scoring Criteria**

Each category is rated on a scale of 1–4, excluding the "friction and shear" category, which is rated on a 1–3 scale. This results in a potential overall score of 23 points, where a higher score indicates a lower risk of PU development and vice versa. A score of 23 indicates no risk of PU development, while a minimum score of 6 points signifies the highest risk for PU development. The scoring scale for the Braden Scale assessment is as follows:

- *Very high risk*: Total score 9 or less
- *High risk*: Total score 10–12
- *Moderate risk*: Total score 13–14
- *Mild risk*: Total score 15–18
- *No risk*: Total score 19–23

## RESULTS

Figure 1 depicts the pretest percentage level of the Braden risk assessment score. In the pretest, none of them was in the scoring category of very high risk and no risk, two (6.67%) were in the scoring category of high risk, 15 (50%) of them were in the scoring category of moderate risk, and 13 (43.3%) of them were in the scoring category of mild risk.

Figure 2 depicts the post-test percentage level of the Braden risk assessment score. In the post-test, none of the patients was in the category of very high risk, high risk, moderate risk, or mild risk; 30 (100%) of them were in the scoring category of no risk.

 

Figure 3 illustrates the contrast between the pretest and post-test levels of the Braden risk assessment score.

**Table 1.** Data pertaining to frequency and percentage distribution of demographic variables among the ICU patients admitted in Apollo hospitals.

| S.N. | Demographic variable | | Frequency | % |
|---|---|---|---|---|
| 1. | *Age* | 41–50 | 1 | 3.33 |
| | | 51–60 | 8 | 26.66 |
| | | 61–70 | 6 | 20 |
| | | 71–80 | 10 | 33.33 |
| | | 81–90 | 5 | 16.66 |
| 2. | *Gender* | Male | 16 | 53.33 |
| | | Female | 14 | 46.67 |
| 3. | *Education* | Professional degree | 5 | 16.66 |
| | | High school | 12 | 40 |
| | | Diploma | 8 | 26.66 |
| | | Middle school | 5 | 16.66 |
| 4. | *Occupation* | Professional | 5 | 16.66 |
| | | Skilled worker | 12 | 40 |
| | | Semiskilled worker | 4 | 13.33 |
| | | Farmer | 6 | 20 |
| | | Shop | 2 | 6.66 |
| | | Clerical | 1 | 3.33 |
| 5. | *Income* | Upper class | 3 | 10 |
| | | Upper middle | 10 | 33.33 |
| | | Lower middle | 17 | 56.66 |
| 6. | *Hospitalization days* | 5 | 15 | 50 |
| | | 6 | 10 | 33.33 |
| | | 7 | 5 | 16.66 |
| 7. | *Comorbidities* | Yes | 28 | 93.33 |
| | | No | 2 | 6.66 |

**Table 2.** Data pertaining to frequency and distribution of pretest level of Braden risk assessment score among the ICU patients admitted in Apollo hospitals.

| Score | Frequency | % |
|---|---|---|
| *Very high risk* | 0 | 0 |
| *High risk* | 2 | 6.67 |
| *Moderate risk* | 15 | 50 |
| *Mild risk* | 13 | 43.3 |
| *No risk* | 0 | 0 |

In the pretest, none of them was in the scoring category of very high risk and no risk, 2 (6.67%) was in the scoring category of high risk, 15 (50%) of them was in the scoring category of moderate risk, 13 (43.3%) of them was in the scoring category of mild risk (Table 2).

**Table 3.** Data pertaining to frequency and distribution of post-test level of Braden risk assessment score among the patients admitted to Apollo hospitals.

| Scoring category | Post-test | % |
|---|---|---|
| *Very high risk* | 0 | 0 |
| *High risk* | 0 | 0 |
| *Moderate risk* | 0 | 0 |
| *Mild risk* | 0 | 0 |
| *No risk* | 30 | 100 |

In the post-test, none of the patients was in the category of very high risk, high risk, moderate risk, or mild risk; 30 (100%) of them were in the scoring category of no risk (Table 3).

Table 4 compares the pretest and post-test levels of Braden risk assessment scores. It indicates that the mean value of the pretest was 14.07, whereas the mean value of the post-test was 20.80. The overall

 

mean difference was 6.73, signifying a substantial difference and suggesting that prophylactic dressing reduces the occurrence of HAPI. Therefore, the data indicates the effectiveness of prophylactic dressing in reducing HAPI (Figure 4).

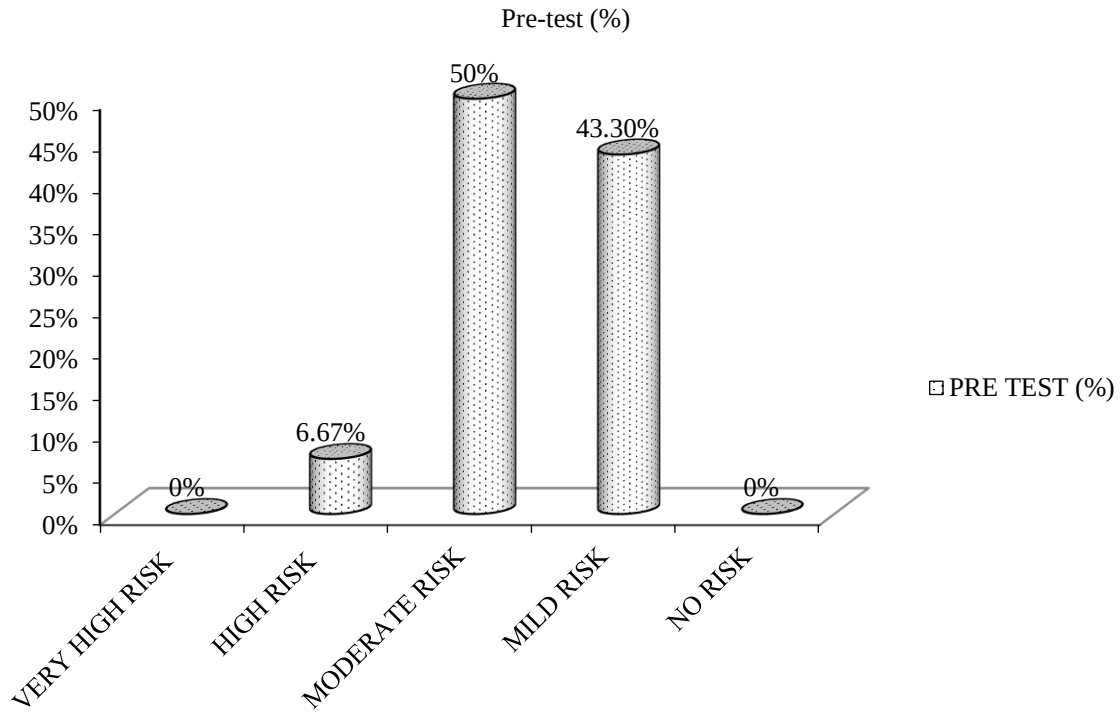


**Figure 1.** Pre-test level of Braden risk assessment scores.

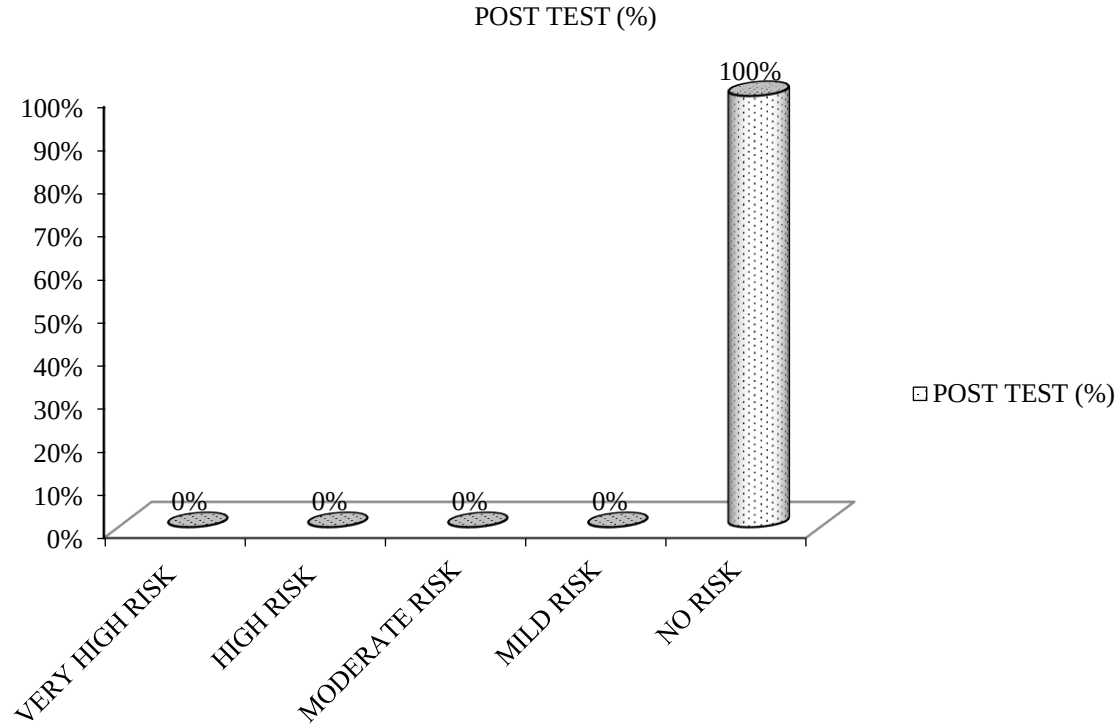


**Figure 2.** Post-test level of Braden risk assessment scores.

 

**Table 4.** Comparison of pretest and post-test levels of Braden risk assessment score among the ICU patients admitted in Apollo hospitals.

| | **No. of patients** | **Pretest mean ± standard deviation (SD)** | **Posttest mean ± SD** | **Mean difference mean ± SD** | **Student's paired t-test** |
|---|---|---|---|---|---|
| HAPI score | 30 | 14.07 ± 1.20 | 20.80 ± 1.35 | 6.73 ± 0.15 | t = 21.43<br>p = 0.0001***<br>df = 29<br>***Very high significant at p ≤ 0.001 |

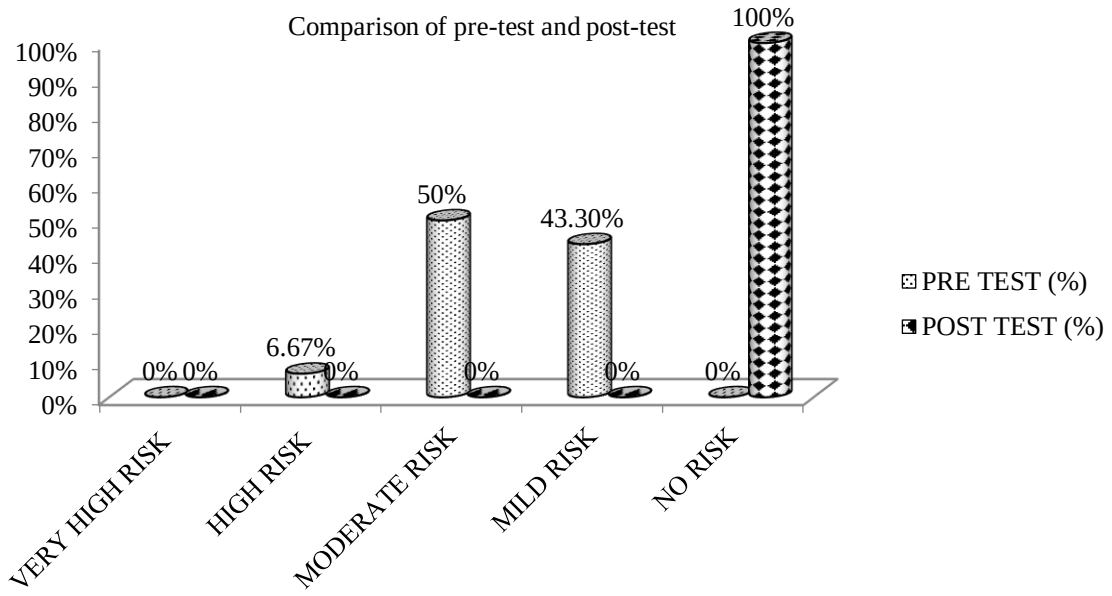


**Figure 3.** Comparison of pretest and post-test levels of Braden risk assessment scores.

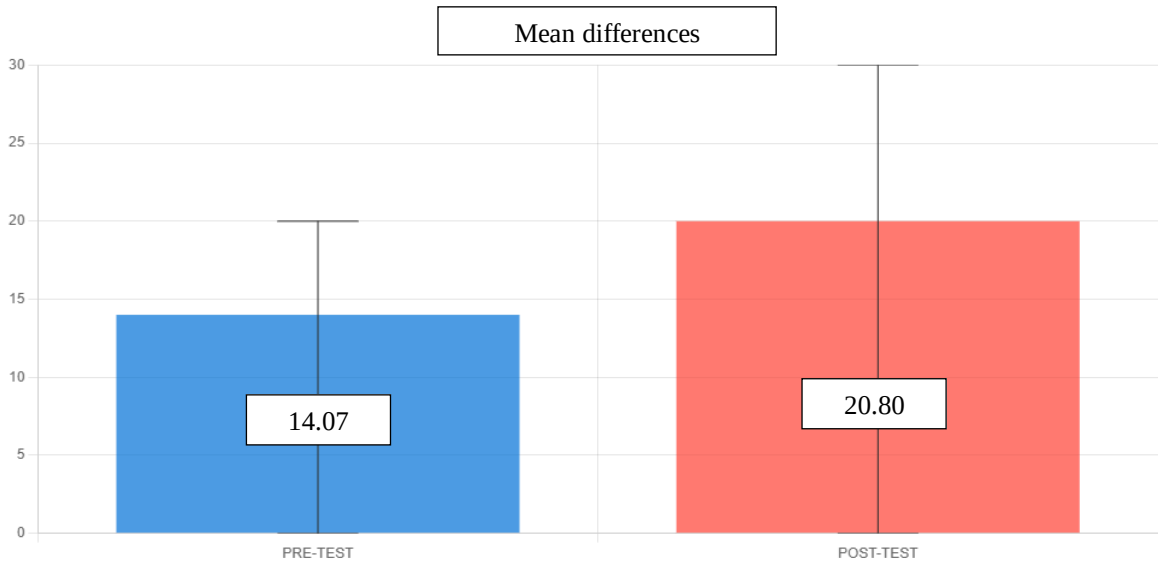


**Figure 4.** A simple error bar diagram compares the pretest and post-test levels of Braden risk assessment scores.

## DISCUSSION

The findings of the current study were disclosed based on the study's objectives. In the pretest, none of them was in the scoring category of very high risk and no risk, two (6.67%) were in the scoring

 

category of high risk, 15 (50%) of them were in the scoring category of moderate risk, 13 (43.3%) of them was in the scoring category of mild risk. In the post-test, none of the patients was in the category of very high risk, high risk, moderate risk, mild risk, and 30 (100%) of them were in the scoring category of no risk [3–5].

The findings of our current study are consistent with those of research conducted by Sillmon et al. in May 2021, which centered on evidence-based practice regarding the use of prophylactic foam dressings for the prevention of HAPI. The review indicated that the use of prophylactic foam dressings led to a reduction in sacral pressure injuries among critical care patients. Although further research is required, the current best evidence supports the application of prophylactic foam sacral dressings for patients vulnerable to HAPI.

The current study's findings are consistent with a study conducted by Walker et al. in October 2017. Their study aimed to evaluate the effectiveness of prophylactic foam dressings in preventing sacral pressure injuries among hospitalized patients at risk. The study's primary focus was on determining the cumulative incidence of patients acquiring sacral pressure injuries. Secondary outcomes encompassed the time it took for sacral pressure injuries to develop, the frequency and severity (stage) of such injuries, the cost-effectiveness of dressings, and a process evaluation. Blinded independent assessors assessed participant outcomes daily for a maximum of 14 days using digitally altered sacral photographs. Participants who developed a sacral pressure injury were monitored for an additional 14 days to estimate the costs associated with pressure injury treatment. Analysis of clinical outcomes involved intention-to-treat, per-protocol, and sensitivity analyses. Another study that supports the result of the current study done by Reid et al. in October 2016 was conducted on PU prevention and treatment: use of prophylactic dressings. Findings from this review indicated that there is a paucity of high-level evidence to support the prophylactic use of dressings to prevent PUs; this paper will examine the emerging literature and consider its relevance to PU prevention protocols [6–8].

In line with the findings of the current research, a study conducted by Beeckman et al. in July 2021 explored the efficacy of silicone adhesive multilayer foam dressings as adjunctive prophylactic treatment for preventing hospital-acquired PUs. This study, characterized as a pragmatic non-commercial multicenter randomized open-label parallel-group medical device trial, demonstrated that the incorporation of silicone foam dressings into standard care effectively reduced the occurrence of PUs categorized as stage 2 or higher in hospitalized high-risk patients. The findings indicated a notable reduction in PUs, specifically in the sacral region, although no statistically significant difference was observed for the heel and trochanter areas [9, 10].

## CONCLUSION

The prevention of HAPI is one of the core quality indicators in healthcare organizations. PUs are a major nurse-sensitive outcome. A prophylactic sacral dressing may help to prevent hospital-acquired sacral pressure injuries. Success requires the implementation of a comprehensive care team, enhanced awareness, and increased education, along with the use of prophylactic sacral dressings in patients identified as high risk for skin breakdown. Therefore, nursing interventions significantly influence both the occurrence and prevention of pressure injuries. The present study results revealed that the mean value of the pretest was 14.07, whereas the mean value of the posttest was 20.8. The overall mean difference was 6.73. This difference is large. Hence, the data was statistically highly significant. This study demonstrates a high level of significance at the $p \leq 0.001$ level. It shows that the prophylactic Allevyn sacral dressing has an effect on the reduction of HAPI in ICU patients.

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