PREVENTION & MANAGEMENT OF PRESSURE INJURIES

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QUESTION

What is the best practice for preventing and managing hospital acquired pressure injuries?

SEARCH LIMITS

English-language, last 5 years, systematic reviews and/or meta-analyses.

SEARCH METHODOLOGY

A systematic search was conducted for literature. The results were screened by two librarians using Covidence. See the Appendix for the PRISMA chart, search terms, and Medline search strategy.

DATABASES SEARCHED

- Medline – index of peer reviewed articles across health sciences and medicine.
- Embase – index of biomed and pharmacological peer reviewed journal articles.
- Emcare – index of nursing, allied health, critical-care medicine and more.
- Cochrane Library – collection of databases containing high-quality independent evidence.
- ProQuest Nursing & Allied Health – scholarly journals, theses, and books for nursing & AH.
- UpToDate & BMJ Best Practice – synthesised evidence for patient care.
- Grey literature – Google, Google Scholar, Trip database, Biomed Central Proceedings.

LITERATURE RESULTS

All articles can be provided in full text - email library@monashhealth.org a list of articles you require.

GENERAL RESOURCES

ONLINE RESOURCES (GREY LITERATURE)

Agency for Healthcare Research and Quality. (2023). **Preventing Pressure Ulcers in Hospitals.** Web link.

- This toolkit aims to assist hospital staff in implementing effective pressure ulcer prevention practices through an interdisciplinary approach to care.

Berlowitz, D. (2023). **Pressure ulcer.** *BMJ Best Practice.* Web link.

- Risk assessment can be done using one or more of the following scales: Norton scale, Waterlow tool, Braden scale, InterRAI Pressure Ulcer Risk scale, Ramstadius tool.
- Pressure relief through repositioning patients, and use of an appropriate support surface, is critical.
- Repositioning frequency should be determined with consideration to the individual's level of activity, mobility and ability to independently reposition.
- Treatment for all patients should include pressure relief, good hygiene practice, and skin care, particularly in the sacral region.
- There is little evidence to suggest which type of wound-cleansing solution or technique, dressing, or topical agent, is most likely to heal pressure ulcers.

Berlowitz, D. (2023). **Clinical staging and general management of pressure-induced skin and soft tissue injury.** *UpToDate.* Web link.

- Reduce or eliminate underlying contributing factors by providing pressure redistribution with proper positioning and support surfaces.
- Provide appropriate local wound care, which may include debridement for patients with necrotic tissue, based on the ulcer's characteristics.
- Consider adjunctive therapies, such as negative pressure wound therapy.
- Monitor and document the patient's progress.

Healthcare Improvement Scotland. (2020). **Prevention and management of pressure ulcers.** Web link.

- Regular reassessment is used to re-evaluate an individual’s risk of developing pressure ulcers or experiencing further damage to existing pressure ulcers.
- A person-centred care plan is developed and implemented to reduce the risk of developing pressure ulcers.

European Pressure Ulcer Advisory Panel, National Pressure Injury Advisory Panel and Pan Pacific Pressure Injury Alliance. (2019). **Prevention and Treatment of Pressure Ulcers/Injuries: Quick Reference Guide.** Web link.

- Provides guidance on risk factors, preventive skin care, repositioning, support surfaces, cleansing, and dressings.

Wound, Ostomy and Continence Nurses Society. (2017). **Guideline for Prevention and Management of Pressure Injuries (Ulcers): An Executive Summary.** Web link.

- Maintain the head-of-bed elevation at/or below 30°, or at the lowest degree of elevation consistent with the patient's medical condition to prevent shear-related injury, and use a 30° side-lying position.
- Schedule regular repositioning and turning.
- Utilize support surfaces (on beds and chairs) to redistribute pressure.
- Avoid foam rings, foam cut-outs, or donut-type devices for pressure redistribution because they concentrate pressure on the surrounding tissue.
- Use incontinence skin barriers, such as creams, as needed to protect and maintain intact skin in individuals who are incontinent and at risk for pressure ulcers

World Union of Wound Healing Societies. (2016). **Role of dressings in pressure ulcer prevention.** Web link.

- Dressings used for PU prevention should be used alongside standard PU prevention protocols.
- Strategies to minimise friction and shear should be continued when a dressing for PU prevention is in place.

National Institute for Health and Care Excellence. (2014). **Pressure ulcers: prevention and management.** Web link.

- Reposition at least every 6 hours.
- Consider a high-specification foam theatre mattress or an equivalent pressure redistributing surface for all adults who are undergoing surgery.
- Consider a high-specification foam or equivalent pressure redistributing cushion for adults who use a wheelchair or who sit for prolonged periods.
- Consider using a barrier preparation to prevent skin damage in adults who are at high risk of developing a moisture lesion or incontinence-associated dermatitis, as identified by skin assessment.

PEER-REVIEWED LITERATURE - IN REVERSE CHRONOLOGICAL ORDER

Articles are grouped by theme:

Each article summary contains excerpts from the abstract and an online link.

SURFACES

Bambi, A. A., et al. (2022). **Reducing the Incidence and Prevalence of Pressure Injury in Adult ICU Patients with Support Surface Use: A Systematic Review.** *Advances in skin & wound care*, *35*(5), 263–270. Click for full-text.

Alternating pressure mattress and viscoelastic foam mattress use both resulted in significantly lower PI incidence. Support surface use is limited, and no particular type is proven to be superior to others.

Damiao, J., et al. (2022). **A systematic review of the effectiveness of pressure relieving cushions in reducing pressure injury.** *Assistive technology*, 1–5. Advance online publication. Request full-text.

Results suggest air-cell cushions provide optimal pressure relief and shear reduction.

Kim, S. Y., et al. (2022). **Effects of alternating pressure air mattresses on pressure injury prevention: A systematic review of randomized controlled trials.** *Worldviews on evidence-based nursing, 19*(2), 94–99. Request full-text.

There is insufficient evidence to suggest that APM is more effective in preventing PIs than other supporting surfaces. It is important to change position regardless of the type of support surface used.

Prado, C. B. C., et al. (2021). **Support surfaces for intraoperative pressure injury prevention: systematic review with meta-analysis**. *Revista latino-americana de enfermagem*, *29*, e3493. Click for full-text.

The use of high-tech support surfaces is an effective measure to prevent pressure injuries in the intraoperative period.

Shi, C., et al. (2021). **Alternative reactive support surfaces (non-foam and non-air-filled) for preventing pressure ulcers.** *The Cochrane database of systematic reviews*, *5*(5), CD013623. Click for full-text.

Reactive gel surfaces used on operating tables followed by foam surfaces applied on hospital beds may increase the risk of having new pressure ulcers compared with alternating pressure (active) air surfaces applied on both operating tables and hospital beds.

Shi, C., et al. (2021). **Alternating pressure (active) air surfaces for preventing pressure ulcers.** *The Cochrane database of systematic reviews*, *5*(5), CD013620. Click for full-text.

Current evidence is uncertain about the difference in pressure ulcer incidence between using alternating pressure (active) air surfaces and other surfaces (reactive water surfaces, reactive fibre surfaces and reactive air surfaces). Alternating pressure (active) air surfaces may reduce pressure ulcer risk compared with foam surfaces and reactive gel surfaces used on operating tables followed by foam surfaces applied on hospital beds.

Shi, C., et al. (2021). **Beds, overlays and mattresses for treating pressure ulcers**. *The Cochrane database of systematic reviews*, *5*(5), CD013624. Click for full-text.

People using reactive air surfaces may be more likely to have pressure ulcers completely healed than those using foam surfaces over 37.5 days' follow-up, and reactive air surfaces may cost more for each ulcer-free day than foam surfaces.

Shi, C., et al. (2021). **Foam surfaces for preventing pressure ulcers.** *The Cochrane database of systematic reviews*, *5*(5), CD013621. Click for full-text.

Foam surfaces may increase pressure ulcer incidence compared with alternating pressure (active) air surfaces and reactive air surfaces. Alternating pressure (active) air surfaces are probably more cost-effective than foam surfaces in preventing new pressure ulcers.

Shi, C., et al. (2021). **Reactive air surfaces for preventing pressure ulcers.** *The Cochrane database of systematic reviews*, *5*(5), CD013622. Click for full-text.

Using reactive air surfaces may reduce the risk of developing new pressure ulcers compared with using foam surfaces. Also, using reactive air surfaces may reduce the risk of developing new pressure ulcers within 14 days compared with alternating pressure (active) air surfaces in people in a nursing home setting.

TOPICAL INTERVENTIONS & DRESSINGS

Rahman-Synthia, S. S., et al. (2023). **Prophylactic use of silicone dressing to minimize pressure injuries: Systematic review and meta-analysis.** *Enfermeria clinica (English Edition)*, *33*(1), 4–13. Request full-text.

he present meta-analysis suggests that silicone dressings consistently reduce the incidence of PI in intensive as well as in non-intensive care settings, regardless of the type of dressing used.

Ryan, H. M., et al. (2023). **Moisturisers, emollients, or barrier preparations for the prevention of pressure injury: a systematic review and meta-analysis.** *Advances in wound care*, 10.1089/wound.2023.0002. Advance online publication. Request full-text.

This review suggests that the use of inert moisturisers, emollients, or barrier preparations for was not effective to prevent pressure. One included study which utilised a combination of neutral body wash and emollient demonstrated a significant reduction in development of stage one and two pressure injuries.

Gong, X., et al. (2022). **Prophylactic sacral protective dressings' effect on preventing pressure injury: A meta-analysis.** *International wound journal*, *19*(6), 1463–1470. Click for full-text.

Sacral protective dressings had a significantly lower incidence of pressure injuries compared with standard care with no sacral protective dressings.

Hernández-Vásquez, A., et al. (2022). **Efficacy and Safety of Topical Application of Olive Oil for Preventing Pressure Ulcers: A Systematic Review and Meta-Analysis of Randomized Controlled Trials.** *International journal of environmental research and public health*, *19*(22), 14921. Click for full-text.

Olive oil for PU prevention may be associated with a shorter development time of PUs and shorter hospital stays.

Lovegrove, J., et al. (2022). **Effectiveness of interventions to prevent pressure injury in adults admitted to intensive care settings: A systematic review and meta-analysis of randomised controlled trials.** Australian critical care, 35(2), 186–203. Click for full-text.

Only prophylactic sacral and heel dressings demonstrated effectiveness in preventing pressure injury in adults admitted to intensive care settings.

Sillmon, K., et al. (2021). **The Use of Prophylactic Foam Dressings for Prevention of Hospital-Acquired Pressure Injuries: A Systematic Review.** *Journal of wound, ostomy, and continence nursing*, *48*(3), 211–218. Click for full-text.

Findings from this review suggest that prophylactic foam dressings decrease sacral HAPI occurrences in critical care patients.

REPOSITIONING

Avsar, P., et al. (2020). **Repositioning for preventing pressure ulcers: a systematic review and meta-analysis.** *Journal of wound care*, *29*(9), 496–508. Request full-text.

The results of this systematic review indicate that more frequent repositioning and use of a turning team reduce PU incidence.

Gillespie, B. M., et al. (2020). **Repositioning for pressure injury prevention in adults.** *The Cochrane database of systematic reviews*, *6*(6), CD009958. Click for full-text.

There remains a lack of robust evaluations of repositioning frequency and positioning for PI prevention and uncertainty about their effectiveness.

TECHNOLOGY

Dweekat, O. Y., et al. (2023). **Machine Learning Techniques, Applications, and Potential Future Opportunities in Pressure Injuries (Bedsores) Management: A Systematic Review**. *International journal of environmental research and public health*, *20*(1), 796. Click for full-text.

The most relevant and potentially useful applications include deep learning techniques and hybrid models, integration of existing risk assessment tools with ML that leads to a partnership between provider assessment and patients' Electronic Health Records (EHR).

Moore, Z., et al. (2023). **A systematic review of movement monitoring devices to aid the prediction of pressure ulcers in at-risk adults**. *International wound journal*, *20*(2), 579–608. Click for full-text.

The synthesis of the literature surrounding bed monitoring technologies for PU risk prediction showed that a range of physical sensors can be used to detect the frequency of movement. Clinical studies showed some correlation between parameters of movement and PU risk/incidence, although the heterogeneity of approaches limits generalisable recommendations.

Zhou, Y., et al. (2023). **A systematic review of predictive models for hospital-acquired pressure injury using machine learning**. *Nursing open*, *10*(3), 1234–1246. Click for full-text.

This review highlights that machine learning is helpful in predicting hospital-acquired pressure injuries; however, in the process of data management, data pre-processing and model validation, some deficiencies still need to be addressed.

Ting, J. J., et al. (2021). **E-Health Decision Support Technologies in the Prevention and Management of Pressure Ulcers: A Systematic Review**. *Computers, informatics, nursing: CIN*, *39*(12), 955–973. Click for full-text.

The findings of this review showed promising results regarding the usability and accuracy of electronic health decision support tools to aid in pressure ulcer prevention and management. Evidence indicated improved clinician adherence to pressure ulcer prevention practices and

decreased healthcare costs postimplementation of an electronic health decision support intervention

Scafide, K. N., et al. (2020). **Bedside Technologies to Enhance the Early Detection of Pressure Injuries: A Systematic Review.** *Journal of wound, ostomy, and continence nursing*, *47*(2), 128–136. Click for full-text.

Evidence identified in this systematic review supports the use of subepidermal moisture measurement devices as effective tools for early pressure injury detection. However, more research in the field of technology-enhanced, pressure injury detection is needed to support the use of existing and emerging devices.

PREDICTION

Chen, B., et al. (2023). **Nutritional status as a predictor of the incidence of pressure injury in adults: A systematic review and meta-analysis**. *Journal of tissue viability*, S0965-206X(23)00043-8. Advance online publication. Click for full-text.

This systematic review and meta-analysis showed that nutritional status is significantly associated with pressure injuries. Malnutrition can increase the incidence of pressure injuries, and specific nutritional interventions can reduce the incidence of pressure injuries compared to standard nutrition.

Chung, M. L., et al. (2023). **Risk factors for pressure ulcers in adult patients: A meta-analysis on sociodemographic factors and the Braden scale.** *Journal of clinical nursing*, *32*(9-10), 1979–1992. Click for full-text.

Patients at risk for new pressure ulcers can be identified by their total Braden score and age, whereas the latter is also connected to deeper pressure ulcers. Nurses and health personnel should pay great attention to patients in older age and undergo specific training to utilise and evaluate the Braden scale effectively, if necessary.

Chen, X, et al. (2023). **Predictive validity of the Jackson–Cubbin scale for pressure ulcers in intensive care unit patients: A meta-analysis**. *Nursing in Critical Care*, 28(3), 370- 378. Request full-text.

The study suggests that the Jackson–Cubbin Scale has a moderate level of predictive validity. Moreover, Jackson–Cubbin's predictive validity could be increased if it was implemented differently based on the attributes of the research participants.

Chaboyer, W., et al. (2022). **Oedema as a predictor of the incidence of new pressure injuries in adults in any care setting: A systematic review and meta-analysis**. *International journal of nursing studies*, *128*, 104189. Click for full-text.

Measuring oedema as a predictor for pressure injury development is showing promise but a stronger body of evidence that takes into consideration other prognostic factors is needed to better understand its benefit.

Moore, Z., et al. (2022). **Measuring subepidermal moisture to detect early pressure ulcer development: a systematic review.** *Journal of wound care*, *31*(8), 634–647. Request full-text.

The findings of this review identified that SEM measurement detects PU development earlier than visual skin assessment. Furthermore, when staff responded to abnormal SEM measurements, prevention strategies were enhanced, with a subsequent reduction in visible PU development. SEM measurement may therefore be a useful addition to PU prevention strategies.

Huang, C., et al. (2021). **Predictive validity of the braden scale for pressure injury risk assessment in adults: A systematic review and meta-analysis**. *Nursing open*, *8*(5), 2194–2207. Click for full-text.

The evidence indicated that the Braden Scale had a moderate predictive validity. It was more suitable for mean age <60 years, hospitalized patients and the Caucasian population, and the cut-off value of 18 might be used for the risk assessment of pressure injuries in clinical practice.

Wilson, H., et al. (2021). **Exploring the Role of Pain as an Early Indicator for Individuals at Risk of Pressure Ulcer Development: A Systematic Review.** *Worldviews on evidence-based nursing*, *18*(4), 299–307. Request full-text.

Pain is associated with PU development; however, further research is required to validate these findings and assess the characteristics associated with pain as a symptom preceding PU development.

Shi, C., et al. (2020). **Nonblanchable erythema for predicting pressure ulcer development: a systematic review with an individual participant data meta-analysis.** *The British journal of dermatology*, *182*(2), 278–286. Request full-text.

This review suggests that people with nonblanchable erythema are more likely to develop new pressure ulcers of stage 2 or above within 28 days than people without nonblanchable erythema.

Wei, M., et al. (2020). **Predictive Validity of the Braden Scale for Pressure Ulcer Risk in Critical Care: A Meta-Analysis.** *Nursing in critical care*, *25*(3), 165–170. Request full-text.

This meta-analysis demonstrated that the Braden Scale had a moderate predictive validity with good sensitivity and low specificity in adult critically ill patients. Further development and modification of this tool or generation of a new tool with higher predictive power is warranted for use in ICU populations.

TREATMENT

Geng, J., et al. (2023). **Moist dressings in the treatment of pressure injuries: A network meta-analysis**. *Journal of tissue viability*, *32*(2), 213–227. Click for full-text.

The effect of moist dressings in treating PI is more advantageous than traditional dressings. The results of the network meta-analysis show that the silver ion dressing and alginate dressing are the best choices in the treatment of PI.

Song, Y. P., et al. (2021). **Negative-pressure wound therapy for III/IV pressure injuries: A meta-analysis.** *Wound repair and regeneration*, *29*(1), 20–33. Request full-text.

Our meta-analysis indicated that NPWT was associated with greater improvements in improving PIs and shorting healing time for III/IV PIs.

Kamińska, M. S., et al. (2020). **Effectiveness of Hydrocolloid Dressings for Treating Pressure Ulcers in Adult Patients: A Systematic Review and Meta-Analysis**. *International journal of environmental research and public health*, *17*(21), 7881. Click for full-text.

The present meta-analysis shows that hydrocolloid dressings are not significantly better than alternative ones in the healing of pressure ulcers in adult patients.

Song, Y. P., et al. (2020). **Zinc Therapy Is a Reasonable Choice for Patients With Pressure Injuries: A Systematic Review and Meta-Analysis**. *Nutrition in clinical practice*, *35*(6), 1001–1009. Click for full-text.

Our systematic review and meta-analysis from clinical research confirmed that zinc therapy can promote wound healing and suggest that medical staff should consider providing patients with zinc during PI treatment.

MEDLINE SEARCH STRATEGY

Ovid MEDLINE(R) ALL <1946 to June 07, 2023>

1 (hospital or inpatient or hospital patient).mp. 1553936

2 exp Hospitals/ or Inpatients/ 340297

3 1 or 2 1671784

4 ((prevent* or avert* or avoid* or impede* or limit* or protect* manage*) adj3 (pressure injur* or pressure ulcer* or pressure sore* or bed sore* or bedsore* or decubitus ulcer*)).mp. 3208

5 Pressure Ulcer/ 13864

6 4 or 5 14391

7 3 and 6 3189

8 limit 7 to (english language and last 3 years) 565

9 meta-analysis/ or "systematic review"/ 312533

10 (systematic adj (review or literature or scoping or narrative or qualitative or evidence or quantitative or meta or critical or mixed studies or mapping or cochrane or integrative)).tw. 285148

11 (metaanaly* or meta analy* or meta-analy*).tw. 270495

12 9 or 10 or 11 450719

13 8 and 12 50

SEARCH TERMS

Concept	MeSH headings	Keywords
Hospital	Hospitals; Inpatients	Hospital; Inpatient; Hospital patient
Pressure Injury	Pressure Ulcer	Pressure injur(y)(ies); Pressure ulcer(s); Pressure sore(s); Bed sore(s); Bedsore(s); Decubitus ulcer(s)
Systematic review	Meta-analysis; Systematic review	Review; Literature; Scoping; Nnarrative; Qualitative; Evidence; Quantitative; Meta; Critical; Mixed studies; Mapping; Cochrane; Integrative; Metaanaly(sis)(ses); Meta analy(sis)(ses); Meta-analy(sis)(ses)

APPENDIX

PRISMA CHART