



# STARS Education and Research Alliance

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THE UNIVERSITY  
OF QUEENSLAND  
AUSTRALIA

Metro North  
Health



Queensland  
Government

## STARS Critically Appraised Topic (CAT) Group: Criteria for the selection of Pressure Relieving Mattresses to prevent pressure injuries

### Specific Question:

What is the evidence-based criteria for selection of air (active) mattresses over the standard STARS high performance foam (static) mattresses and which patient group are these most effective in the hospital rehabilitation setting for pressure injury prevention?

### Clinical bottom line

There is no defined evidence-based criteria for selection of air (active) mattresses over standard STARS high performance reactive foam mattresses. From the evidence it is not possible to confirm that active mattresses compared to static mattresses are the best intervention to reduce/prevent pressure injuries.

### Why is this important?

Pressure injuries are recognised on the National list of Hospital Acquired Injuries as part of the Comprehensive Care standard for National Safety and Quality Health Service Standards. Pressure Injuries are adverse events, associated with health care, that can cause significant harm and discomfort to patients. They are a major contributor to the care needs of patients, are associated with financial penalties and in many patients are preventable.

New pressure injury prevention guidelines were released in 2025, which outline that full body support surfaces play a role in redistributing pressure, reducing friction and shear, and aid microclimate management, all important in prevention of pressure injury development and management.

While STARS has access to both active air-mattress and high-performance reactive foam mattresses for use with patients. There is a high demand for active air-mattresses at STARS as there is a belief that air-mattresses are superior in preventing pressure injuries over the standard STARS high performance reactive foam mattresses. Air mattresses are significantly more expensive compared with reactive foam mattresses and in the stars context it was important to determine whether further investment was warranted in obtaining more air mattresses or whether patients should be allocated one type of mattress over another depending on their set of pressure injury risk factors. Further, it is important to understand whether this belief is based on evidence or whether certain criteria need to be established to allocate this high-cost intervention to only the most vulnerable patients.

### Inclusion Criteria

List

### Search dates

2020 – 2025

### Type of Study

Systematic reviews

### PICOT

	Description	Search terms
Population and Setting	Rehabilitation in hospital	Rehabilitation Hospital

	Population includes stable spinal cord injury, aged population, vascular disease, amputees, severely malnourished, stroke, Co-morbidities Two criteria – that require are mattresses at STARS - Pre-existing pressure injuries, bariatric patients.	Long stay Sub-acute  Exclude acute setting  Don't limit patient groups/disorders
<b>Intervention or Exposure (ie what is being tested)</b>	Air (active) Pressure relieving mattresses	
<b>Comparison, if any</b>	Foam mattresses- high performance mattresses-standard Air mattresses	Air mattresses Active mattresses Static mattresses Foam mattresses
<b>Outcomes of interest</b>	Pressure injuries Inhibiting recovery – reduces independence, reduces mobility in bed.	Pressure Pressure injuries
<b>Types of studies</b>	High-level evidence, including Systematic reviews Meta-analyses Cochrane studies RCTs	However, information about patients undergoing rehab, and how it can be more difficult for people using Air Mattresses, is important and may not be in reviews

**Databases Searched**

PubMed, Embase, CINAHL Complete, Cochrane Library

**Date of search**

3 September 2025

**Search Strategies** (including subject headings)

**Search strategy includes key concepts and limits:**

(air OR active) **AND** (mattress) **AND** (pressure) **AND** (prevention) **AND** (2020-2025 publication year range) **AND** (English language) **AND** (limit to Humans, exclude animal studies)

**Relevant guideline - Support Surfaces — International Guideline**

**PubMed** 313 results

Includes [MeSH](#)

("Air"[Mesh] OR "air"[tiab] OR "active"[tiab] OR "dynamic"[tiab]) AND ("Beds"[Mesh] OR "mattress"[tiab] OR "mattresses"[tiab] OR "surface"[tiab] OR "surfaces"[tiab] OR "bed"[tiab] OR "beds"[tiab]) AND ("Pressure Ulcer"[Mesh] OR "pressure"[tiab]) AND ("prevent\*"[tiab]) AND (2020:2025[dp]) AND (eng[la] OR und[la]) NOT ("Animals"[Mesh] NOT "Humans"[Mesh])

**CINAHL Complete (EBSCOhost)** 85 results  
Includes [CINAHL Subject Headings](#)

(MH "Air+" OR XB("air" OR "active" OR "dynamic")) AND (MH "Beds and Mattresses+" OR XB("mattress" OR "mattresses" OR "surface" OR "surfaces" OR "bed" OR "beds")) AND (MH "Pressure Ulcer+" OR XB("pressure")) AND (XB("prevent\*")) AND PY 2020-2025 AND (LA English) NOT ((MH "Animals+" OR MH "Animal Studies" OR TI animal model\*) NOT MH "Human")

**Embase (Elsevier)** 256 results

Includes [Emtree](#), limited to relevant publication types (articles, articles in press, reviews)

('air'/exp OR "air":ti,ab OR "active":ti,ab OR "dynamic":ti,ab) AND ('bed'/exp OR "mattress":ti,ab OR "mattresses":ti,ab OR "surface":ti,ab OR "surfaces":ti,ab OR "bed":ti,ab OR "beds":ti,ab) AND ('decubitus'/exp OR "pressure":ti,ab) AND ("prevent\*":ti,ab) AND [2020-2025]/py AND [english]/lim AND ('article'/it OR 'article in press'/it OR 'review'/it) NOT ('animal experiment'/de NOT ('human experiment'/de OR 'human'/de))

**Cochrane Library (Wiley)** 119 results – 8 Cochrane Reviews and 111 Trials

Includes MeSH

Advanced Search > search manager

Further limited Trials tab to year first published from 2020 to present

### Advanced Search

Search
Search manager
Medical terms (MeSH)
PICO search

Save this search
View/Share saved searches
Search help

+					
-	+	#1	MeSH descriptor: [Air] explode all trees	MeSH	689
-	+	#2	("air" OR "active" OR "dynamic"):ti,ab	Limits	172124
-	+	#3	#1 OR #2	Limits	172219
-	+	#4	MeSH descriptor: [Beds] explode all trees	MeSH	391
-	+	#5	("mattress" OR "mattresses" OR "surface" OR "surfaces" OR "bed" OR "beds"):ti,ab	Limits	55572
-	+	#6	#4 OR #5	Limits	55639
-	+	#7	MeSH descriptor: [Pressure Ulcer] explode all trees	MeSH	1146
-	+	#8	("pressure"):ti,ab	Limits	177990
-	+	#9	#7 OR #8	Limits	178096
-	+	#10	(prevent*):ti,ab	Limits	203330
-	+	#11	#3 AND #6 AND #9 AND #10	Limits	141

with Cochrane Library publication date from Jan 2020 to present

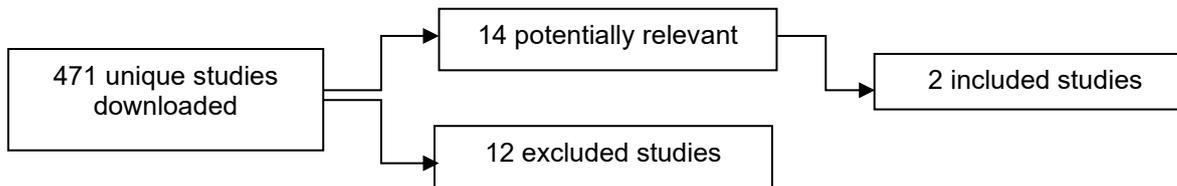
ID	Search Hits
#1	MeSH descriptor: [Air] explode all trees 689
#2	("air" OR "active" OR "dynamic"):ti,ab 172124
#3	#1 OR #2 172219
#4	MeSH descriptor: [Beds] explode all trees 391
#5	("mattress" OR "mattresses" OR "surface" OR "surfaces" OR "bed" OR "beds"):ti,ab 55572
#6	#4 OR #5 55639

#7 MeSH descriptor: [Pressure Ulcer] explode all trees 1146  
#8 ("pressure"):ti,ab 177990  
#9 #7 OR #8 178096  
#10 (prevent\*):ti,ab 203330  
#11 #3 AND #6 AND #9 AND #10 with Cochrane Library publication date from Jan 2020 to present 141

### Search process

Developed search in PubMed and translated for other health databases. Exported results to EndNote Library. Removed duplicates using the SR Accelerator Deduplicator tool - <https://sr-accelerator.com/#/deduplicator>. Imported deduplicated results into new EndNote Library for identifying potentially relevant results. For potentially relevant results, copied formatted references in an annotated style into Word document for CAT Group to select studies for critical appraisal.

## Results



First Author, year and type of study	Population and setting	Intervention or exposure tested	Study results	Assessment of quality and comments
Kim, S et al 2022 Systematic Review	Participants included were adults admitted to hospitals and nursing homes. Excluded patients included paediatrics, wheelchair users and operating theatres.	This Systematic review aimed to compare the Effects of alternating pressure air mattresses with other types of supporting surfaces on pressure injury prevention	There is insufficient evidence to suggest that APM is more effective in preventing PIs than other supporting surfaces. Evidence to date suggests that APM can be used in patients at risk for PIs. It is important to change position regardless of the type of support surface used. Highly controlled RCTs with low risk of bias are needed to provide strong evidence for identifying the most effective PI prevention support surfaces	The CASP systematic appraisal tool was used to analyse the risk of bias in this study. This review has a strong PICO format, strong inclusion and exclusion criteria and included only RCTs. Whilst data could not be combined due to lack of heterogeneity the variations between studies were thoroughly discussed.
Shi, C et al 2021 Overview of Cochrane Reviews & meta-analysis	This study summarises the evidence from Cochrane reviews that assess the effects of beds, overlays and mattresses on reducing the incidence of PIs in any setting or population.	Beds, overlays and mattresses for preventing and treating pressure ulcers	This study identifies that more high-quality research is required for the comparison of reactive air surfaces with alternating pressure air surfaces in reducing pressure injury risk.  It found that reactive air surfaces are better compared with foam surfaces and that alternating air surfaces are better compared with foam surfaces. Reduce pressure injury risk	The CASP systematic appraisal tool was used to analyse the risk of bias in this study.  Methods of data extraction were explicit, used the grade approach to assess the quality of their included studies, pooled data to ensure statistical heterogeneity.

## Summary

The analysis of the systematic reviews by both Kim et al (2022) and Shi et al (2021) identify that there is low quality evidence to suggest that alternating air surfaces is superior to reactive foam surfaces in pressure injury prevention. Part of the difficulty is that there is a large variety between different types of mattresses with poor descriptions of brands used in the studies. While the studies describe alternating air mattresses or reactive mattress; it is difficult to determine if the products used in the studies are directly reflective of the products used in Queensland health facilities.

The evidence also indicates that reactive foam mattresses and air-mattresses are only a small part of pressure injury prevention, and that a holistic approach is required. The holistic approach must include nutrition and hydration assessment and interventions, frequent repositioning, reduction of shear, use of supportive seating considerations, specialised offloading for prevention heel injuries and rotating and removing devices that are related pressure injuries.

## Implications for Practice/research

With the new CACP changes that have been rolled out in the ieMR, the water low assessment for pressure injury risk has been removed. This means that clinician judgement is required to determine whether a patient is at risk for pressure injury or not; and that risk stratification of “low, medium or high” are no longer attributed to patients.

Due to the removal of this risk stratification, nursing clinicians may be tempted to allocate all patients at risk of a pressure injury an air mattress. Leading to less vulnerable patients to be inappropriately allocated air mattress; with the thought that this will prevent them from developing pressure injuries.

This critically appraised topic highlights that there is little evidence to show that active air-mattress is superior to reactive foam mattress and that clinicians must holistically assess a patient's risk factors and direct interventions toward reducing the identified risks including malnutrition, repositioning and the selection of pressure relieving surfaces depending on where the patient is in their journey.

A further CAT group topic may explore Bundles of care to reduce pressure injuries for patients in subacute inpatient settings.

As part of the findings from this cat group, STARS has developed a set of selection criteria for air mattress that will be incorporated into the updated pressure injury prevention procedure. Further, the comprehensive care committee will continue to monitor pressure injury trends and analyse how the mattress selection criteria may be influencing pressure injury rates and outcomes.

## What would you tweet? (140 characters)

Our CAT group analysis has identified that it is difficult to determine whether air mattresses or reactive foam mattresses are superior for the prevention of pressure injuries. The selection of support surfaces is only one small component for pressure injury prevention. Clinicians must perform individualised and holistic patient assessments, tailoring bundles of care to include malnutrition assessment and interventions, appropriate repositioning schedules and careful selection of support services.

## Critical Appraisal Topic Group Team Members

Amy Jones, Nursing, Clinical Nurse Consultant

Derek Morgan, Nursing, SEALS Clinical Nurse Consultant

Lei Yao, Nursing,

Natalie Barker, UQ Librarian

Lisa Wright, Occupational Therapist, STARS Research Support Officer

Pip Logan, Occupational Therapist, SERA Co-director

Mick Collins, Engineer, Rehabilitation Engineering Team Leader

## CAT group meeting dates

28/08/2025, 16/10/2025

## References

1. Kim, S. Y., et al. (2022). "Effects of alternating pressure air mattresses on pressure injury prevention: A systematic review of randomized controlled trials." Worldviews Evid Based Nursing **19**(2): 94-99.
2. Shi, C., et al. (2021). "Beds, overlays and mattresses for preventing and treating pressure ulcers: an overview of Cochrane Reviews and network meta-analysis." Cochrane Database Systematic Review **8**(8): Cd013761.