

Review: Foam-based, constant low-pressure mattresses are better than standard hospital mattresses for reducing pressure ulcers

Cullum N, McInnes E, Bell-Syer SE, Legood R. Support surfaces for pressure ulcer prevention. *Cochrane Database Syst Rev.* 2004;(3):CD001735.

QUESTION

In patients at high risk for pressure ulcers (PUs), are pressure-relieving surfaces more effective than standard support surfaces for reducing PUs?

METHODS

Data sources: Studies were identified by searching the Specialized Trials Register of the Cochrane Wounds Group (to January 2004), containing searches in MEDLINE, EMBASE/Excerpta Medica, and CINAHL; the Cochrane Central Register of Controlled Trials (Issue 3, 2004); hand-searching conference proceedings; scanning references of articles; and contacting experts in the field.

Study selection and assessment: Studies in any language and in any setting were selected if they were randomized controlled trials (RCTs) that evaluated low-technology (low-tech), constant low-pressure (CLP) surfaces (standard foam mattresses [SFM], alternative foam mattresses [AFMs]; gel-, fiber-, air-, water-, or bead-filled mattresses; and sheepskin), high-technology (high-tech) surfaces (alternating pressure [AP] mattresses, air fluidized beds, and low air-loss beds), and other surfaces (turning beds or frames, wheelchair cushions, operating table overlays, and limb protectors). Criteria used to assess study quality included allocation concealment and blinding.

Outcomes: Incidence of PUs, grades of new PUs, and cost-effectiveness.

MAIN RESULTS

41 RCTs ($n = 6875$) met the selection criteria. Methodological quality was generally poor: Allocation concealment was inadequate in 21 RCTs (51%), and blinding was reported in 10 RCTs (24%). 21 RCTs included patients without preexisting pressure ulcers. **Low-tech CLP supports:** In 5 of 6 RCTs, CLP surfaces reduced PUs more than did SFMs (relative risk [RR] ranged from 0.20 [95% CI 0.09 to 0.45] to 0.36 [CI 0.22 to 0.59]). 1 RCT ($n = 297$) found that sheepskin reduced PUs more than standard treatment (RR 0.30, CI 0.17 to 0.52). Pooling 5 RCTs using a random-effects model showed that patients who received AFMs had fewer PUs than did those who received SFMs (Table). Other low-tech surfaces did not differ for reducing PUs. **High-tech pressure supports:** 1 RCT ($n = 327$) showed that AP supports were better than SFMs for reducing PUs (RR 0.32, CI 0.14 to 0.74). Various AP supports and CLP surfaces did not differ for reducing PUs (Table).

Other surfaces: 1 RCT ($n = 100$) showed that low air-loss beds were more cost-effective than standard beds in the intensive care unit (RR 0.24, CI 0.11 to 0.53). 4 RCTs evaluated different methods of pressure relief on the operating table. Of these, 2 RCTs showed greater reduction in PUs with a micropulse alternating system than with standard care (Table).

CONCLUSIONS

In patients at high risk for pressure ulcers, foam-based, constant low-pressure (CLP) mattresses are better than standard hospital mattresses for reducing pressure ulcers. High-technology, CLP, alternating pressure, and other surfaces have varied success in reducing pressure ulcers.

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Pressure-relieving surfaces vs standard support surfaces for reducing pressure ulcers at 5 days to 6 months*

Number of trials (n)	Comparisons	Weighted event rates	RRR (95% CI)	NNT (CI)
5 (2016)	AFM vs SFM	1% vs 16%	60% (26 to 79)	7 (4 to 50)
8 (1019)	AP surface vs CLP surface	21% vs 25%	18% (-19 to 43)	Not significant
2 (368)	Micropulse vs SFM	2% vs 8%	79% (30 to 94)	17 (10 to 50)

*CLP = constant low pressure; AFM = alternative foam mattress; SFM = standard foam mattress; AP = alternating pressure. Other abbreviations defined in Glossary; weighted event rates, RRR, NNT, and CI calculated from data in article using a random-effects model.

COMMENTARY

Prevention of pressure sores is a major concern in health care facilities. Risk factors include immobility, moisture, malnutrition, and acute illnesses. Skin and soft tissues beneath bony prominences are especially vulnerable. Devices that redistribute body weight over wider areas (CLP) or limit the time of exposure (AP) are more costly than simpler foam mattresses, but studies addressing their effectiveness are difficult to interpret for various methodological reasons.

The systematic review by Cullum and colleagues is a limited update of a previous Cochrane review by the same group, in an attempt to make existing data more useable. 41 RCTs were identified and categorized according to type of surface studied: low-tech (CLP), high-tech (AP), and other surfaces. Detailed information on reference mattresses was not available. The time of exposure, setting, and definition of high-risk patients varied. 20 RCTs included patients who did not have intact skin at inception.

The quality of the trials was heterogeneous. Methodological issues of concern were inadequate sample size, allocation concealment, and blind-

ing when assessing outcomes. The authors are aware of these limitations, and the conclusions of their review are appropriately conservative. They also point out the absence of data to support any pressure relief from seating cushions.

The review by Cullum and colleagues is most valuable for making the better studies in the field readily available to clinicians. In patients who are at high risk for PUs, CLP mattresses are better than standard hospital mattresses (although clinicians need to determine if their standard hospital mattresses are similar to those used in the included studies) for reducing ulcer development. In addition to the evidence provided in this review, durability of equipment, cost, and patient and staff preferences should be considered.

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