

This evidence is associated with the *Best Practice* topic [Pressure ulcer](#).

## Pressure ulcers

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### Preventive interventions for pressure ulcers

# Alternating pressure surfaces to prevent pressure ulcers

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#### Summary statement

##### Incidence of pressure ulcers

*Compared with standard foam mattress* Alternating pressure surfaces may be more effective (very low-quality evidence).

*Compared with constant-low-pressure supports* We don't know whether alternating pressure surfaces are more effective than constant-low-pressure supports such as viscoelastic foam (very low-quality evidence).

*Compared with each other* We don't know whether one alternating pressure surface is more effective than the others (low-quality evidence).

**For GRADE evaluation of interventions for pressure ulcers, see [table](#).**

#### Benefits

We found two systematic reviews (search dates 2004, 11 RCTs<sup>[7]</sup> and 2006, 13 RCTs, 11 of which were included in the first review<sup>[8]</sup>) and one additional RCT<sup>[12]</sup> comparing alternating pressure surfaces versus standard foam mattresses, constant low pressure supports, or versus each other. The second systematic review<sup>[8]</sup> did not report outcomes data for included RCTs or perform a meta-analysis. Instead, it gave a narrative summary of results. We have therefore reported meta-analysis results from the earlier review,<sup>[7]</sup> and have reported further RCTs identified by the second review<sup>[8]</sup> separately.

##### **Alternating pressure surfaces versus standard foam mattress:**

One RCT (482 people) identified by the first review compared three interventions: alternating pressure (166 people), standard foam mattress (161 people), and water-filled mattress (155 people).<sup>[7]</sup> It found that an alternating pressure surface significantly reduced the incidence of pressure ulcers compared with a standard foam mattress (327 people: RR 0.32, 95% CI 0.14 to 0.74; NNT for 10 days' treatment 11, 95% CI 6 to 34). A second RCT (108 older hospitalised people confined to bed)<sup>[12]</sup> included in the second review<sup>[8]</sup> compared alternating pressure (both single- and double-layer air cell) mattresses versus a standard polyester foam mattress.<sup>[12]</sup> The RCT found that both alternating pressure mattresses significantly reduced pressure ulcers compared with standard foam mattresses (3% with double-layer air cell v 19% with single-layer air cell v 37% with standard foam; P less than 0.01 between all groups). However, this RCT did not undertake an intention-to-treat analysis, and only 68% of randomised participants were included in the analysis.

##### **Alternating pressure surfaces versus constant-low-pressure supports:**

The first review found no significant difference in the rates of pressure ulcer formation between alternating pressure and constant low pressure (8 RCTs, 1019 people, RR of developing a pressure ulcer 0.82, CI 0.57 to 1.19).<sup>[7]</sup> However, the

meta-analysis pooled trials of several different types of surface and remains underpowered (the wide confidence intervals do not exclude a clinically important treatment effect). One RCT (447 people in hospital) identified by the second review [8] compared alternating pressure overlays versus a viscoelastic foam mattress plus standardised 4-hourly turning protocol for the prevention of pressure ulcers. [13] Study participants had grade 1 pressure ulcers or a Braden Scale score of less than 17. The RCT found no significant difference in the incidence of grade 2–4 pressure ulcers between treatment groups (AR of grade 2–4 pressure ulcer: 15.3% with alternating pressure v 15.6% with viscoelastic foam;  $P = 1.0$ ); the duration of follow-up was unclear. The viscoelastic foam mattress group developed significantly more pressure ulcers on the heel (15% with alternating pressure v 46% with viscoelastic foam;  $P = 0.006$ ). However, the alternating-pressure-overlay group developed more severe ulcers (77% grade 2 and 24% grade 3 or 4 ulcers with alternating pressure v 94% grade 2 and 6% grade 3 or 4 ulcers with viscoelastic foam mattress;  $P = 0.034$ ). [13]

### Alternating-pressure surfaces versus each other:

Three small RCTs (181 people) identified by the first review compared different alternating pressure devices versus each other; none found a significant difference (RR values all not significant), although all three RCTs were underpowered. [7] The second review [8] identified one large RCT (1972 acute and elective inpatients at least 55 years old admitted to vascular, orthopaedic, medical, or care-of-the-elderly wards) reported in two publications [14] [15] comparing alternating pressure mattresses versus alternating pressure mattress overlays. The RCT found no significant difference between groups in the proportion of people developing a new pressure ulcer of grade 2 or above (106/990 [10.7%] with overlay v 101/982 [10.3%] with mattress; mean difference 0.4%, 95% CI  $-2.3$  to  $+3.1\%$   $P = 0.75$ ). [15] A cost-effectiveness assessment of the trial found no significant difference between alternating pressure mattresses and overlays in mean time to development of an ulcer or hospital stay, although people using pressure mattresses took longer to develop an ulcer, and stayed in hospital for less time than people using overlays (development of an ulcer: mean difference 11 days, 95% CI  $-24$  to  $+4$  days; hospital stay: 19 days with mattress v 20 days with overlays, reported as non-significant, CI not reported, absolute numbers not reported for either outcome). [16]

### Harms

The reviews, [7] [8] one RCT included in the second review, [13] and the additional RCT [12] gave no information on adverse effects. The RCT identified by the second review comparing alternating pressure mattresses versus alternating pressure overlays found a significantly higher proportion of people in the overlay group requested a mattress change because of dissatisfaction compared with people in the mattress group (230/990 [23%] with overlay v 186/982 [19%] with mattress;  $P = 0.02$ ; mean difference 4.4%, 95% CI 0.7 to 7.9%). [15]

### Comment

Most RCTs were small and of poor quality, and few performed the same comparison.

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