Preventing Surgery-Related Pressure Ulcers


Rationale: Patients undergoing long, complicated surgeries are at especially high risk of developing a PU, with reported overall incidence of 8.5% PUs in surgical patients in the United States, 14.3% in Sweden, and 21.2% in the Netherlands. Prevention by using effective high-specification pressure-redistribution surfaces (PRS) and techniques are reportedly among the most efficient methods of preventing PU development.

Objective: The authors conducted a systematic review of the literature comparing PU prevention outcomes using PRS to those using standard foam mattresses to support their facility’s decision to implement PRS use in preventing surgery-related PU development.

Methods: MEDLINE, Web of Science databases plus conference proceedings and articles on file were searched from inception to May 2012 for the following terms: pressure ulcer, operation, surgery, mattress, foam, polymer, pad, overlay, surface, or interface. Studies qualifying for inclusion in the systematic review were randomized clinical trials (RCTs) or quasi-RCTs of subjects undergoing surgeries associated with high PU risk (eg, surgeries of expected duration > 3 hours, cardiac, general, orthopedic, or vascular surgery), comparing PRS to standard hospital mattress use during or after surgery, and reporting the incidence of surgery-related PU development. Cohort studies, case-control studies, cross-sectional studies, and studies that compared different kinds of PRS to each other were excluded. Pressure-redistribution surfaces included air-fluidized or fluidized-therapy beds, dry visco-elastic polymer, a multicell pulsating dynamic mattress, and thermo-active visco-elastic foam overlays. Control mattresses were all standard hospital foam mattresses (FM). Duration of follow-up was 1-7 days for most studies, ranging from 1-28 days.

Results: Overall incidence of surgery-related PUs was 15.9%, with 301 of 1895 patients experiencing at least 1 new, surgery-related PU in the 10 RCTs. A funnel plot revealed no significant publication bias. Overall, the odds ratio of developing a surgery-related PU using PRS was 0.31 compared to 1 using an FM \((P = 0.0003)\). Data from intra-operative, postoperative, or combined intra- and postoperative intervals of PRS or FM use were not homogeneous, possibly related to differences in types and durations of surgery and follow-up, so trials studying each interval were meta-analyzed separately (Figure 1). The reduction in surgery-related PUs using PRS compared to FM intraoperatively (5 RCT, \(P = 0.05\)) was not statistically significant, but was so if PRS were used instead of FM postoperatively (3 RCT, \(P = 0.007\)), or intra- and postoperatively combined (2 RCT, \(P = 0.01\)).

Authors’ Conclusions: Postoperative use of PRS can effectively decrease the incidence of developing a surgery-related PU. Further evidence is needed to determine if using these surfaces intra-operatively is similarly effective.
What Treatments Work for PUs?


**Rationale:** Pressure ulcers increase morbidity, mortality, and health care costs for up to 3 million Americans.

**Objective:** Summarize evidence comparing safety and effectiveness of interventions to treat adults with PUs.

**Methods:** A systematic review searched MEDLINE, EMBASE, CINAHL, Evidence-Based Medicine Reviews, and Cochrane databases from January 1, 1985 to October 17, 2012 for RCTs or observational studies comparing effects of PU treatments in adults. Noncomparative intervention series were included for surgical interventions and safety evaluation. A panel of authors cited in this Comparative Effectiveness Research systematic review commissioned by the US Agency for Health Care Research and Quality (AHRQ), extracted data and summarized all qualifying studies.

**Results:** Of 1836 studies reviewed, 174 qualified for inclusion, including 92 that evaluated complete PU healing. Moderate-strength evidence supported some interventions that increased wound healing or improvement. These included the use of air-fluidized beds compared with other support surfaces (5 studies, 908 subjects); protein-containing nutritional supplements compared with placebos or other routine measures of nutritional support (12 studies, 562 subjects); radiant heat dressings compared with other dressings (4 studies, 169 subjects); and electrical stimulation compared with other dressings (4 studies, 169 subjects); and electrical stimulation compared with a sham treatment (9 studies, 397 subjects). Low strength of evidence supported hydrocolloid dressings compared with conventional care (10 studies); platelet-derived growth factor compared with placebo (4 studies); alternating pressure beds compared with air, fluid, or standard beds (4 studies); low air loss beds compared with other surfaces (4 studies); or with low air loss bed overlays (1 study). Most studies were of poor quality, with inadequate follow-up periods to assess complete wound healing. Healing outcome measures were often heterogeneous, causing difficulty in comparing study results.

**Authors’ Conclusions:** Limited evidence supports firm conclusions about the best approaches for PU treatment.

**Clinical Perspective:** Huang et al. have established that postoperative PRS are the best standard of care for preventing postsurgical PUs. Look closely at Figure 1 for an extra pearl hidden in their meta-analysis. You likely noticed the huge drop in surgery-related PU incidence if PRS were used both intraoperatively and postoperatively. Pressure ulcer incidences were more than 4 times as high if the PRS or FM were used only postoperatively, than if they were used both intraoperatively and postoperatively. This suggests that adding any form of intraoperative PRS (or FM) to a similar postoperative regimen may help prevent postsurgical PU development. Huang et al. could not test for the differences in this meta-analysis due to heterogeneity of the data from different studies across these intervals; yet, their results (Figure 1) make a compelling case for asking whether intraoperative pressure relief further reduces postsurgical PU incidence beyond the current best evidence-based standard of care: postoperative PRS. In fact, those using FM both intraoperatively and postoperatively reported similar postsurgical PU incidence (7.8%) to those who used a PRS only postoperatively (8.3%). As Huang et al. noted, this experimental question needs to address 2 independent variables: off-loading surface and interval of use. Well-conducted, blind-evaluated RCTs need to determine if adding standardized intraoperative PRS (or FM) reduces surgery-related PU incidence in subjects receiving standardized postoperative PRS. This would answer the key question to gauge the true con-
tribution that intraoperative PRS or FM adds to postoperative PU prevention using PRS. It seems logical to suggest that intraoperative off-loading during the 3-4 hours of surgery may prove effective only if the patient’s pressure points are also off-loaded during the successive days of immobility.

Saha et al. reminds us that our PU study design and outcome measures must improve if we are to meet the quality standards the AHRQ sets for today’s medical science to meet the goal of informing clinical decisions to help improve outcomes. Both studies sound an appeal to standardize PU outcome measures.

References

This article was not subject to the WOUNDS peer-review process.