Pressure-redistribution Surfaces for Prevention of Surgery-related Pressure Ulcers: A Meta-Analysis

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Abstract
Pressure-redistribution surfaces are generally recommended to prevent pressure ulcers (PUs) in high-risk patients, but their use in surgery-related PU prevention remains controversial. A meta-analysis was conducted to assess the relative preventive impact of pressure-redistribution surfaces versus standard hospital mattresses (usually a hospital-issue, foam-based mattress) on the incidence of surgery-related PUs. Systematic literature searches were performed using the terms pressure ulcer, operation, surgery, mattress, foam, polymer, pad, overlay, surface, and interface. Country, race, language, and publication year of articles was not restricted; randomized or quasi-randomized controlled trials were eligible for analysis. Odds ratio (OR) with 95% confidence intervals (CIs) for surgery-related PU incidence in patients using support surfaces versus standard mattress were calculated by random-effects model. Of the 316 studies identified, 10 involving a total of 1,895 patients were eligible for inclusion in the meta-analysis. Seven studies were randomized, controlled and three were quasi-randomized controlled trials. Patients who were provided a support surface had a significantly decreased incidence of surgery-related PUs (OR 0.31 [95% CI 0.17–0.59]) compared to patients using a standard mattress. Subgroup analysis showed pressure-redistribution surfaces used intra-operatively did not decrease the incidence of surgery-related PUs (OR 0.59, [95% CI 0.34–1.01]), but PU incidence decreased with postoperative (OR 0.07 [95% CI 0.01–0.49]) as well as with intra-operative and postoperative use (OR 0.20 [95% CI 0.06–0.73]). Funnel plot diagrams suggest a minimal risk of bias. Sensitivity analysis did not materially change the result of the main meta-analysis. Postoperative use of pressure-redistribution surfaces can effectively decrease the incidence of surgery-related PUs, but evidence to substantiate intra-operative use is insufficient. Patients at high risk for surgery-related PUs should be placed on a pressure-redistribution surface during the postoperative period, but intra-operative use can remain prudent until more well-designed, adequately powered, urgently needed studies are performed.

Keywords: pressure ulcer, surgery, beds, operating table, meta-analysis


Potential Conflicts of Interest: none disclosed

Introduction
The patient who undergoes a long complicated surgery is potentially at risk for development of pressure ulcers (PUs). A US survey of 1,543 patients from 33 of 50 states indicated the overall incidence of PUs in surgical patients was 8.5% (95% confidence interval [CI]: 6.1% to 10.9%). The situation is similar in other countries, with reported prevalence rates of 14.3% in Sweden and 21.2% in Netherlands. Surgery-related PUs are associated with adverse patient outcomes and may contribute to patient pain, depression, loss of function and independence, increased incidence of infection and sepsis, additional surgical interventions, prolonged hospital stays, and increased costs of care.4,5

Prevention usually is considered the most efficient method to address the problem; numerous studies have investigated PU prevention strategies. A systematic review that included 59 randomized controlled trials (RCTs) indicated using support surfaces, repositioning the patient, optimizing nutritional status, and moisturizing sacral skin are appropriate strategies to prevent PUs. Pressure-redistribution surfaces can reduce local pressure and decrease the incidence of PUs. A Cochrane review specifically assessed support surfaces
used for PU prevention. The evidence showed people at high risk of developing PUs should use higher-specification foam mattresses rather than standard hospital foam mattresses. It is well accepted that pressure-redistribution surface use is an effective prevention strategy for PU.

However, support surface use to prevent surgery-related PUs remains controversial. Some studies showed a mattress overlay or pressure-relieving overlay placed on an operating table is an effective prevention strategy. In a sequential, randomized controlled trial with 446 general, vascular, and gynecological surgical patients, Nixon et al. reported a significant reduction in the odds of developing a PU using a dry viscoelastic polymer pad as compared to the standard operating table mattress (22 out of 205, [11%] versus 43 out of 211 [20%], respectively; \( P = 0.007 \)). In a experimental study, Schultz et al. randomly assigned 413 surgical patients to receive “usual perioperative care” or a new mattress overlay and found after six postoperative days, 89 patients (21.5%) developed PUs, and patients with PUs who used the new mattress overlay had statistically fewer new ulcers (34 out of 207, [16.4%]) versus 55 out of 206 [26.7%], respectively; \( P < 0.02 \)). Postoperatively used pressure-redistribution surfaces also can decrease the incidence of surgery-related PUs. In a retrospective study, Jackson et al. provided air-fluidized therapy beds to postoperative cardiovascular patients, and only one out of 27 patients developed a PU, compared to 40 PUs in 25 patients not using the treatment. In a randomized, controlled trial conducted among post-hip fracture patients, Donnelly et al. reported 31 out of 119 (26%) in the control group developed PUs, compared to eight out of 120 in the pressure-redistributing support surface group (7%, \( P < 0.001 \)).

Other studies noted effective prevention trends for pressure-redistribution surface use that did not reach statistical significance. In a randomized controlled trial, Russell and Lichtenstein reported that two out of 98 (2.0%) persons undergoing cardiovascular surgery using a dynamic pressure system developed a PU, compared to seven out of 100 (7.0%) in the conventional management group. (\( \chi^2=2.806, P = 0.094 \)). In a retrospective case-control study, Sewchuk et al. reported eight out of 100 (8.0%) PUs in cardiac surgery patients using a pressure-redistributing support surface, compared to nine out of 50 (18.0%) using conventional management (\( \chi^2=3.317, P = 0.069 \)).

Chalian et al. reported no ulcers among 20 head and neck surgery patients (0.0%) provided pressure-redistributing support surfaces, compared to four out of 19 (21.1%) provided conventional management (\( \chi^2=3.84, P = 0.050 \)). One recent randomized, controlled trial of 175 patients found adverse results; patients laying on the foam overlay experienced slightly more PUs (17.6%) than patients on the standard OR table without the foam overlay (11.1%); the RCT was terminated per these results.

Because a decision was needed in the authors’ facility regarding the use of pressure-redistribution surfaces for preventing surgery-related PUs, a meta-analysis was conducted to summarize the evidence collected on pressure-redistribution surfaces compared to standard mattresses for surgical patients and to assess the PU incidence of PUs when pressure-redistribution surfaces were used for surgery-related PU prevention.

**Key Points**

- The authors analyzed data from 10 clinical studies to evaluate the effectiveness of pressure-redistribution surfaces for the prevention of pressure ulcers (PUs) in surgical patients.
- Results suggest postoperative, but not intra-operative, use of support surfaces significantly reduce the risk of PUs.
- The authors recommend routine use of pressure-redistribution surfaces during postoperative care and that additional studies to investigate their efficacy during surgery should be conducted.

**Methods**

**Inclusion and exclusion criteria.** Studies were eligible for inclusion in this analysis if they met the following criteria: 1) study type: RCTs and quasi-randomized controlled trials; 2) types of participants: high-risk, surgery related-PU patients (high-risk surgeries include cardiac surgery, general surgery, orthopedic surgery, vascular surgery, or surgeries with an expected operative time of more than 3 hours); 3) types of intervention: studies comparing pressure-redistribution surfaces to standard mattress; and 4) types of outcomes: studies that assessed the incidence of surgery-related PUs were included. Excluded were studies involving patients in medical wards, mixed wards, and the community, as well as cohort studies, case-control studies, cross-sectional studies, and studies that compared different kinds of pressure-redistribution surfaces to each other (not to standard mattresses).

**Search strategy.** A search was conducted using MEDLINE (PubMed, www.ncbi.nlm.nih.gov/pubmed/), and Web of Science (http://webofknowledge.com/) from their inception to May 2012. The search strategy included the terms pressure ulcer, operation, surgery, mattress, foam, polymer, pad, overlay, surface, and interface. The search strategy for MEDLINE and Web of Science are listed in Table 1. There were no search restrictions related to country, race, language, or year of publication. Conference proceedings and scanned references of retrieved articles also were hand-searched to identify any additional relevant studies.

**Selection of eligible studies.** First, two reviewers independently identified randomized or quasi-randomized controlled trials through title or abstract; based on inclusion and exclusion criteria, eligible studies were included through abstract.
Quality assessment. The quality of included studies was determined using the Cochrane Collaboration’s tool for assessing risk of bias.\(^{16}\) The tool included randomized sequence generation, allocation concealment, blinding of participants and personnel, blinding of outcome assessment, incomplete outcome data, selective reporting, and other bias. Items in the risk-of-bias assessment were judged adequate (+), unclear (?), or having potential for bias (−) for each study. Two reviewers independently assessed the quality. Disagreements were resolved by discussion and by seeking the opinion of a third reviewer.

Data extraction. Information about methodological characteristics (study design, randomization method, allocation concealment, blinding, follow-up, baseline comparability, and other study characteristics) study year, country, surgical population, age, surgical duration, type of pressure-reducing mattress, timing of reporting incidence, pressure-reducing mattress applied time, and PU incidence in two groups was extracted independently by two reviewers. The data were extracted to the pre-designed forms. Any differences of opinion were resolved by discussion and consensus reached by discussion with a third reviewer.

Statistical analysis. A meta-analysis was performed using Review Manager (RevMan) software (version 5.0.21; Update Software Ltd, Oxford, Oxon, UK). Statistical heterogeneity was explored by \(\chi^2\) and inconsistency (\(I^2\) statistics; an \(I^2\) value of 50% or more represented substantial heterogeneity.\(^{17}\) If no heterogeneity was found, a fixed-effects model was used for meta-analysis; otherwise, a random effect model based on the Der Simonian and Laird estimator was used.\(^{18}\) Summary OR and 95% CI estimates were calculated by taking a weighted average of individual study results. Overall effects were determined using the Z test. Two-sided \(P < 0.050\) was considered statistically significant. Potential publication bias was evaluated by funnel plot. Asymmetry in funnel plots indicates publication bias in meta-analysis. Subgroup meta-analyses were performed in intra-operative and postoperative subgroups. The intraoperative period begins when the patient is transferred to the operating room bed and ends with the transfer of a patient to the postanesthesia care unit (PACU). The postoperative period begins after the transfer to the PACU and terminates with the resolution of the surgical sequelae. Sensitivity analysis was performed by removal of three quasi-randomized controlled trials.

Results

Study characteristics. Ten (10) studies met the inclusion criteria and provided sufficient data for meta-analysis.\(^{8,15,19,20}\) Figure 1 shows the stages used in identifying studies for inclusion in the review. Study characteristics from the 10 articles included in meta-analyses are shown in Table 2.

Five studies\(^{8,10,13,14,15}\) were conducted in the US; two\(^{8,11}\) in the UK; and Germany,\(^{13}\) Canada,\(^{12}\) and the Netherlands\(^{18}\) each contributed one study. Seven (7) studies followed an RCT design; the other three studies were quasi-randomized controlled trials.\(^{10,13-15}\) Pressure-reducing mattresses involved in the studies included air- or fluidized-therapy beds,\(^ {16,13,14,19}\) pressure-distributing support surfaces,\(^{9,12,13,19}\) dry viscoelastic polymer,\(^{9}\) a multilayer pulsating dynamic mattress,\(^{12}\) and thermo-active viscoelastic foam overlays.\(^{15}\) The control mattresses used for comparison all were standard foam mattresses. In terms of study time frame, five studies used the mattresses intra-operatively,\(^ {8,9,13,15}\) three involved postoperative use,\(^ {10,11,20}\) and in two studies mattresses were used intra- and postoperatively.\(^ {12,19}\)

Risk of bias. One RCT was rated as level 1b evidence with low risk of bias; six RCTs as level 1d evidence with high risk of bias, and the remaining three quasi-randomized controlled trials as level 2 evidence with uncertain risk of bias. The remaining 10 studies were quasi-randomized controlled trials.

Table 1. Search strategy for Pubmed

<table>
<thead>
<tr>
<th>Feature</th>
<th><a href="http://www.o-wm.com">www.o-wm.com</a></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Pressure Ulcer [Mesh Terms]</td>
<td>April 2013</td>
</tr>
<tr>
<td>2. Surgical Procedures, Operative [Mesh Terms]</td>
<td></td>
</tr>
<tr>
<td>3. Mattress [Tw] or Foam [Tw] or Polymer [Tw] or Pad [Tw] or Overlay [Tw] or Surface* [Tw] or Interface [Tw]</td>
<td></td>
</tr>
<tr>
<td>4. #1 and #2 and #3</td>
<td></td>
</tr>
</tbody>
</table>

The search strategy for Web of Science

1. TS = (Pressure SAME Ulcer*) or TS=(Pressure SAME Sore*) or TS=(Bed SAME Sore*) or TS=(Decubitus SAME Ulcer*)
2. TS = Surg* or TS= Operat*
3. TS = Mattress or TS = Foam or TS = Polymer or TS = Pad or TS = Overlay or TS = Surface* or TS = Interface
4. #1 and #2 and #3

Tw = Text Words; Ts = Topics; * = character substitution

![Figure 1. Study selection flow diagram.](image)
<table>
<thead>
<tr>
<th>Study, Year</th>
<th>Country</th>
<th>Study design</th>
<th>Surgical population</th>
<th>Age (years)</th>
<th>Surgical duration</th>
<th>Pressure-redistribution surfaces</th>
<th>Timing of reporting incidence</th>
<th>PU incidence (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Donnelly et al, 2011</td>
<td>UK</td>
<td>RCT</td>
<td>Hip fracture operated with hemi arthroplasty dynamic hip screw or other</td>
<td>&gt;65</td>
<td>&lt;2 hours 176 &gt;2 hours 55</td>
<td>Heel elevation plus pressure-redistributing support surface</td>
<td>Day 10–12 Postoperatively</td>
<td>6.7% (8/120) 26.1% (31/119)</td>
</tr>
<tr>
<td>Jackson et al, 2011</td>
<td>US</td>
<td>Quasi-randomized trial</td>
<td>Cardiovascular surgery patients with required vasopressors for at least 24 hours or required mechanical ventilation for at least 24 hours postoperatively</td>
<td>Range: 41–89 Mean: 6 hours</td>
<td>Air-fluidized therapy beds</td>
<td>During ICU Postoperatively</td>
<td>3.6% (1/28) 100.0% (25/25)</td>
<td></td>
</tr>
<tr>
<td>Feuchtinger et al, 2006</td>
<td>German</td>
<td>RCT</td>
<td>Cardiac surgery with Extracorporeal circulation</td>
<td>Range: 33–92 Mean: 68 &gt;1.5 hours</td>
<td>4-cm thermoactive viscoelastic foam overlays</td>
<td>Day 1–2 Intra-operative</td>
<td>17.6% (15/85) 11.1% (10/90)</td>
<td></td>
</tr>
<tr>
<td>Sewchuk et al, 2006</td>
<td>US</td>
<td>Quasi-randomized trial</td>
<td>Cardiac surgery</td>
<td>Range: 40–94 Mean: 224–725 minutes</td>
<td>Fluid pressure-reducing OR bed mattress</td>
<td>Day 1–28 Intra-operative</td>
<td>8.0% (8/100) 18.0% (9/50)</td>
<td></td>
</tr>
<tr>
<td>Chalian et al, 2001</td>
<td>US</td>
<td>Quasi-randomized trial</td>
<td>Head and neck surgeries</td>
<td>Range: 36–81 Mean: 11–23.5 minutes</td>
<td>Fluid pressure-reducing OR mattress (RIK)</td>
<td>Day 1–7 Intra-operative</td>
<td>0.0% (0/20) 21.1% (4/19)</td>
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<tr>
<td>Russell et al, 2000</td>
<td>Canada</td>
<td>RCT</td>
<td>Cardiovascular surgery</td>
<td>Mean: 65 &gt;3 hours</td>
<td>Multicell pulsating dynamic mattress</td>
<td>Day 1–7 Intra-operative and postoperatively</td>
<td>2.0% (2/98) 7.0% (7/100)</td>
<td></td>
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<tr>
<td>Aronovitch et al, 1999</td>
<td>US</td>
<td>RCT</td>
<td>Cardiothoracic, urologic, or vascular</td>
<td>Mean: 64 &gt;3 hours</td>
<td>Dry polymer overlays, PRMS after surgery</td>
<td>Day 1–7 Intra-operative and postoperatively</td>
<td>1.1% (1/90) 8.8% (7/80)</td>
<td></td>
</tr>
<tr>
<td>Schultz et al, 1999</td>
<td>US</td>
<td>RCT</td>
<td>Scheduled surgery</td>
<td>25–91 (56%) Mean: 66 &gt;2 hours</td>
<td>Foam overlays</td>
<td>Day 1–6 Intra-operative</td>
<td>16.4% (34/207) 26.7% (55/206)</td>
<td></td>
</tr>
<tr>
<td>Nixon et al, 1998</td>
<td>UK</td>
<td>RCT</td>
<td>General vascular and gynecological</td>
<td>55–69 (56%) 70+ (44%) &gt;1.5 hours</td>
<td>Dry viscoelastic polymer pad</td>
<td>Day 1 Intra-operative</td>
<td>10.7% (22/205) 20.4% (43/211)</td>
<td></td>
</tr>
<tr>
<td>Hofman et al, 1994</td>
<td>Netherlands</td>
<td>RCT</td>
<td>Femoral-neck fracture operated with AO screws, dynamic hip screw, gamma nail, arthroplasty, blade-plate</td>
<td>Mean: 80 Not mentioned</td>
<td>Pressure-decreasing mattresses</td>
<td>Week 1 Postoperatively</td>
<td>25.0% (5/20) 63.7% (14/22)</td>
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</table>
trials were rated level 2b evidence. Overall, a general risk of bias was observed (see Figure 2).

Main meta-analysis. Results of a total of 1,895 patients were reported in the 10 studies and included in the meta-analysis, including 301 patients with PUs. There was substantial heterogeneity among the 10 studies ($\chi^2 (9) = 32.31$, $P = 0.000$, $I^2 = 72\%$). The summary OR of patients using pressure-redistribution surfaces compared with patients used standard mattress was $0.31$ (95% CI; $0.17–0.59$; $Z = 3.59$, $P = 0.000$) (see Figure 3). The overall effect also shows a statistically significant prevention effect. The funnel plot showed symmetry, suggesting minimal publication bias in this meta-analysis (see Figure 4).

Sensitivity analysis. The three quasi-randomized controlled trials showed the summary OR was $0.42$ (95% CI $0.24–0.74$; $\chi^2 (6) = 16.82$, $P = 0.010$, $I^2 = 64\%$; $Z = 3.02$, $P = 0.003$). From the three RCTs that used pressure-reducing mattresses intra-operatively, an OR of $0.69$ (95% CI $0.36–1.32$; $\chi^2 (2) = 6.62$, $P = 0.04$, $I^2 = 70\%$; $Z = 1.12$, $P = 0.26$) was calculated. From the two RCTs that used pressure-reducing mattress postoperatively, an OR of $0.20$ (95% CI $0.10–0.40$; $\chi^2 (1) = 0.01$, $P = 0.94$, $I^2 = 0\%$, $Z = 4.50$, $P = 0.000$) was calculated. None of the quasi-randomized controlled trials were removed from the analysis of pressure-reducing mattresses used intra-operatively and postoperatively.

Sensitivity analysis did not materially change the result of the main meta-analysis, which indicated sufficient evidence for postoperative use of pressure-redistribution surfaces to decrease the incidence of surgery-related PUs but insufficient evidence for pressure-redistribution surface use intra-operatively.

Discussion

It has been accepted that PUs are caused by three different tissue forces: pressure, shear, and friction. These three forces play an important role in the occurrence of surgery-related PUs. Patients are immobile, causing prolonged pressure from the operating table during surgery. Shearing and friction injury also can occur as patients are repositioned on, then moved from, the table to transport. Additionally, some patients are not repositioned for hours or even days to accommodate use of balloon pumps or other devices postoperatively.

In this meta-analysis, use of pressure-redistribution surfaces postoperatively was found to effectively decrease the incidence of surgery-related PUs, with OR $0.07$ (95% CI; $0.01–0.49$; $Z = 2.68$, $P = 0.007$) compared with standard mattresses. Two systematic reviews demonstrated similar results. In this meta-analysis, three included studies have investigated the pressure-reduction capabilities of support surfaces postoperatively. Hofman et al.’s prospective, randomized, controlled clinical trial with 44 patients tested the Comfortex DeCube mattress (Comfortex, Winona, MN) against a standard hospital mattress (used in the authors’ facility) in 44 patients; at 1 week, 25% of the patients provided the study mattress and 64% of the patients provided the standard mattress had clinically relevant PUs ($P =$...
At 2 weeks, the figures were 24% and 68% (P = 0.0067), respectively. Jackson et al reported that in 42 postoperative cardiovascular surgery patients, one out of 27 developed a PU (Stage I) while on the air-fluidized therapy bed, compared with 40 ulcers in 25 patients before the intervention (P = 0.0000). In a randomized, controlled trial with 239 postoperative hip fracture patients, Donnelly et al reported a significant reduction in the odds of developing a PU using a pressure-redistributing support surface, compared to standard care (eight out of 120 [7%] versus 31 out of 119, [26%], respectively; P < 0.001).

Although the current study did not demonstrate a significant prevention effect intra-operatively for pressure-reducing surfaces, sensitivity analysis also did not materially change the result. Pressure-redistributing surfaces can effectively prevent damage from pressure, shear force, and friction, but particular pathogenesis for surgery-related PUs intra-operatively may play a role. It is possible that during the surgical period, anesthesia agents can depress the autonomic nervous system, causing enough vasodilatation to lower blood pressure and subsequently decrease tissue perfusion. In cardiac surgery, extracorporeal circulation will lead to vasoconstriction of peripheral blood vessels, reducing the supply of blood to the tissue; hemoglobin concentration also will decrease in tissue perfusion. Such circumstances may help explain why a pressure-reducing mattress cannot effectively prevent surgery-related PUs intra-operatively.

Although a pressure-reducing mattress used intra-operatively may not have a significant prevention effect, results of additional research merit attention. In a randomized, controlled trial study, Feuchtinger et al found patients placed on an OR table foam overlay experienced slightly more PUs (17.6%) than patients on the standard OR table without the foam overlay (11.1%), adverse results that caused the termination of the RCT. These findings and the results of the current meta-analysis suggest intra-operative use of pressure-reducing mattresses for preventing surgery-related PUs should be implemented with caution. Because the overall result of the current meta-analysis did not meet statistical significance, more well-designed, adequately powered studies are urgently needed. However, in the postoperative subgroup and intra-operative/postoperative subgroup, meta-analysis found a significant reduction in the incidence of PUs when pressure-reducing mattresses were used.

Sensitivity analysis did not materially change the result, leading the authors to support routine use of pressure-redistributing surfaces during the postoperative period, if only for high-risk patients.

In terms of risk assessment, previous meta-analysis showed the Braden Scale was not a good instrument for risk assessment of surgery-related PUs and cannot be used alone for predicting PU risk in surgical patients. A national survey in the US of 1,128 patients found the most common types of surgery associated with PU were cardiac procedures (n = 331, 29.3%), general/
Conclusions

A meta-analysis of relevant publications shows postoperative use of pressure-redistribution surfaces can effectively decrease the incidence of surgery-related PUs, while evidence is still not sufficient for routine use of these surfaces intra-operatively.

The authors suggest pressure-redistribution surfaces should be used routinely during the postoperative period for high-risk, surgery-related PU patients, and intra-operative use should be more judicious, pending the results of more well-designed, adequately powered, urgently needed studies.

Reference


Thoracic procedures (n = 313, 27.7%), orthopedic procedures (n = 232, 20.6%), vascular procedures (n = 110, 9.8%), head and neck (n = 50, 10.0%), and neurologic (n = 58, 5.2%). The current meta-analysis included four cardiac surgery and two orthopedic surgery patients, persons undergoing high-risk surgical procedures. The national survey also found PUs were present in 5.8% of patients whose surgery lasted for 3 to 4 hours; the proportion of patients with intra-operative PUs increased as the surgical time exceeded 3 hours. Schouchhoff’s review indicated long procedure time also is a risk factor for intra-operative PUs. Another prospective comparative study with 286 adult patients undergoing surgical treatment has found low American Society of Anesthesiologists (ASA) or New York Heart Association (NYHA) scores, low food intake, and female gender were risk factors for surgery-related PUs. These considerations, not just Braden Scale score, should help determine patient risk for surgery-related PUs.

Limitations

This type of meta-analysis comes with inherent limitations. First, the quality of the included studies is relatively poor. Only one RCT was rated as level 1b evidence with low risk of bias. Many studies had important methodological limitations, especially in terms of randomized sequence generation and allocation concealment. Most of the included studies were rated unclear or found “potential for bias”. Second, the results of meta-analysis showed substantial heterogeneity between the studies. The heterogeneity may come from the type of pressure-reducing mattress (air-fluidized therapy beds, thermoactive viscoelastic foam overlays, pulsating dynamic mattress, polymer overlays, foam overlays, pressure-decreasing mattresses, or others), time of reporting incidence (Day 1–2, Day 1–3, Day 1–7, Day 1–28, or others), surgical population, surgical duration (cardiac procedures, orthopedic procedures, and general procedures >1.5 hours, >2 hours, >3 hours), and other factors. Such limitations originate from the design of the included studies. Clearly, well-designed, large, multicenter randomized trials with the same purpose are urgently needed.