CSI (Common Surgical Injury) Investigation

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Situation

The serious nature of hospital-acquired heel pressure ulcers (HPUs) is gaining additional attention in medical research, as prevalence surveys are now regularly differentiating between sites of pressure ulcers. The site of the heel is the second most prevalent site for pressure ulcers. The National Pressure Ulcer Advisory Panel (NPUAP) reported a pressure ulcer prevalence rate of approximately 15% in acute care and price reports have shown HPUs consistently account for approximately 50% of pressure ulcers. Mortality related to HPUs includes pain, reduced mobility, and limb amputation. Patients with diabetes and HPUs are at high risk for complications, with increased risk for major amputation. Patients with pressure ulcers also have higher mortality rates, with an observational study reporting a 1.92 relative risk index for death in elderly patients with pressure ulcers (n=325), which was nearly twice that of patients without pressure ulcers. A separate study reported septicaemia as the etiologic factor in 40% of deaths in patients with pressure ulcers. The economic impact of perioperative HPUs is substantial, with estimates ranging from $25,000 - $50,000 a year to a ‘100 bed facility’ (see Figure 1). Recent peer-reviewed publications have focused attention on the negative outcomes of HPUs in critically-ill and surgical patient populations. Furthermore, the intensive efforts of the Centers for Medicare and Medicaid Services to prevent hospital-acquired conditions have also brought HPUs to the forefront in research. Skin care bundles have been put into effect in many hospitals across the nation.

The elevation of heels for off-loading is a well-known recommendation for PU prevention. However, the logistics related to maintaining consistent heel pressure off-loading remain a challenge (see Figure 2). Black recommends utilizing a device that elevates immobile patients’ legs, specifically in patients recovering from hip and knee surgery. Research has concluded patients undergoing surgery are at increased risk for development of pressure ulcers compared to the general patient population and, given this body of evidence, two researchers from separate facilities partnered to determine the effectiveness of heel pressure off-loading in at-risk surgical patients.

The heel protector boot has been effective in preventing heel skin injury during and after surgery in preliminary patient population

Background

Two researchers partnered on an IRB-approved, 2-facility, prospective, observational study. The purpose of the study was to determine if a pressure-relieving heel protector boot prevented HPUs during and after surgery. A total of 20 patients were planned for selection for this study (10 per facility), with inclusion criteria consisting of:

- adherence to 2 or more Scott Triggers (see Figure 3);
- no pre-existing sign of heel pressure injury; scheduled for a minimum of a 3 hour procedure ‘time in to time out of the OR’;
- scheduled for an inpatient hospital stay postoperatively;
- and all patients able to sign informed consent.

If a patient was unable to follow protocol, the procedure lasted less than 3 hours, or they were discharged before their second postoperative day, then the patient would be excluded from the study.

It became apparent after inception of this study that the timeline would need to be extended due to various unanticipated barriers. In this poster we report the preliminary findings of 15% of the desired patient population, the types of barriers encountered, and solutions which are being employed.
the effectiveness of heel pressure offloading in at-risk surgical patients. Patients with diabetes and heel pressure ulcers (n=303), which was nearly twice that of 1.92 relative risk index for death in elderly patients with perioperative heel pressure ulcers is substantial, with estimates ranging from $200 to $400.

Figure 1: Economic impact of hPUs

Table 1: Projected costs - total knees/hips PPRU

<table>
<thead>
<tr>
<th>Study/yr</th>
<th>Economic outcomes</th>
<th>Projected costs - total knees/hips PPRU</th>
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<tr>
<td>2002</td>
<td>Average cost to heal a PI is $5,000 - $7,000</td>
<td>$34,000 Total Knee Replacement + $15,000 Total Hip Replacement + $779,000 Procedures</td>
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<tr>
<td></td>
<td>Annual cost to treat surgical PI is $750 M - $1.5 Billion</td>
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12.7% of total procedures get Stage 1-5 HA PO

9.10% of total POs are Stage II, III or IV, than 9,805 x $2.600 = $25,493,000

Figure 2: What is a Heel Off Loading Device (HOLD)?

All devices are NOT created equal

<table>
<thead>
<tr>
<th>HOLDs</th>
<th>VS.</th>
<th>Heel Pads</th>
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<tr>
<td>Apples</td>
<td>VS.</td>
<td>Oranges</td>
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Qualitative metrics can assist with identifying unforeseen barriers and addressing with solutions

Assessment

To date, 5 patients have been recruited to the study:

- 3 patients completed study, 2 patients were excluded
- There has been no skin breakdown during following surgery in patients completing the study

The offloading intervention appears to be effective for high-risk surgical patients thus far (10% of patients have been recruited – study is ongoing)

The Scott Tiggers appear to be effective in identifying at-risk surgical patients for this type of study.

The heel protector has been effective in preventing heel skin injury during and after surgery in elderly patient population.

Unforeseen Barrier: The researchers underestimated the breadth and amount of education necessary for perioperative nursing staff. As this intervention extends from surgery and throughout the postoperative stay, detailed in-serviceing of the study protocol and appropriate application of the heel protector is essential.

Solution: Additional and ongoing educational in-service is being provided to the perioperative nursing staff and the study is ongoing.

Unforeseen Barrier: Application of the heel protector boot and intermittent pneumatic compression (IPC) sleeves were not occurring at the same time. This resulted in additional steps for the perioperative nursing staff.

Solution: Nurse education has been implemented and is ongoing regarding concomitant application of the heel protector boot and IPC sleeve.

Unforeseen Barrier: The timing of application of the heel protector boot is critical to patient compliance. Many patients are already apprehensive in the preoperative holding area, and the boot was refused on occasion due to concerns of sensations of constriction and heat.

Solution: The boots are now being applied on arrival to the operative suite to lessen patient apprehension and enhance compliance with the hPU prevention protocol.

Figure 3: Preoperative Assessment Utilizing Scott Triggers

- Assess preoperative patients for all 4 risk triggers:
  - Age over 62 years
  - Senior-adult BMI >15
  - ASA Score B or greater
  - Surgery > 3 hours

- Consider type of surgery: cardiac, vascular, trauma, transplants, and bariatric surgery
- 2 or more triggers = high-risk surgical patient

RECOMMENDATIONS

After assessing the current and ongoing study, and preliminary results, the following recommendations are being made by the researchers to ensure 100% recruitment of patients and provide guidance to researchers considering a similar study:

- Change management and compliance is critical to the success of any intervention. Initial and ongoing caregiver education and in-service sessions are essential to ensure proper understanding of the study protocol, appropriate timing for and application of the boot
- Pre-select supine operative cases such as vascular procedures, general surgical procedures, oto-aryngologic procedures, or some urologic procedures
- Apply IPC sleeves and heel protectors at the same time by tying the tube to sleeve through the top of the boot
- Apply boots on arrival to the surgical suite to avoid adding to existing patient apprehension and enhancing compliance with the hPU prevention protocol

References