NPWT: Incision Management in high risk Cardiothoracic patients – reducing surgical site infection and length of stay

Introduction

A surgical site infection (SSI) accounts for approximately 16% of all hospital acquired infections and are estimated to double the length of post-hospital stay and significantly increase the cost of care1. Advances in surgery and anaesthesia have resulted in patients who are at higher risk of developing an SSI being considered for surgery2. In open Cardiothoracic Surgery, the mortality associated with deep sternal infections is substantial3.

In 2011, the Imperial College Cardiothoracic Surgery Unit found their SSI rate to be significantly high at 15%, compared to the national average of 4.5%. Evidence is increasing to demonstrate the effect of using Negative Pressure Wound Therapy (NPWT) as a preventative tool for managing a closed incision4,5 which has been found to reduce the incidence of wound infection post sternotomy in high risk obese patients6.

The Cardiothoracic Surgery Unit evaluated the effect of using PICO™ NPWT device as the post-operative dressing on high risk patients undergoing Coronary Artery Bypass Graft (CABG) surgery. The aims of the evaluation were to assess the effectiveness of PICO with regard to reducing post-surgical complications and length of hospital stay in high-risk patients. PICO is a single use, disposable battery operated device which delivers continuous NPWT at -80mmHg and can be used to manage surgically closed incisions.

Method

PICO was used for the post-operative management of closed sternal incisions and donor leg sites for high risk CABG patients.

- BMI >30 or weight >120kg
- Diabetic patients or those with HbA1c >40
- Patients with renal failure / other co-morbidities known to have a negative effect on wound healing outcomes.

Non- high risk patients received a standard film dressing. Data was collected in two stages:

- May – December 2014: Introduction of PICO
- January – May 2015: Implementation of PICO throughout the unit

Results: 1st set of data:

<table>
<thead>
<tr>
<th></th>
<th>Total cases</th>
<th>Standard film dressing</th>
<th>PICO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>204</td>
<td>130</td>
<td>74</td>
</tr>
<tr>
<td>SSI</td>
<td>126</td>
<td>88</td>
<td>38</td>
</tr>
<tr>
<td>Sternal</td>
<td>126</td>
<td>84</td>
<td>42</td>
</tr>
<tr>
<td>Diaper</td>
<td>126</td>
<td>84</td>
<td>42</td>
</tr>
<tr>
<td>Healing problems non SSI</td>
<td>126</td>
<td>84</td>
<td>42</td>
</tr>
<tr>
<td>Average LOS (days)</td>
<td>12.5</td>
<td>9.4</td>
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</tbody>
</table>

141 patients were managed with standard film dressings with a 5.7% rate of SSI. 5 patients suffered an SSI at the donor site and 3 experienced the same issues at the sternal incision site.

There were no incidences of SSI or any wound healing problems experienced at either the donor or sternal site with PICO (n=21).

Wound healing challenges in the standard film dressing group occurred in 38 patients - one of which was at the sternal site (image 1) and 37 at the donor site (image 2). These illustrate the authors’ pre-evaluation concerns. Such challenges at the leg donor sites mainly referred to the management of exudate levels from ‘leaky legs’ (see image 2). In the PICO group of patients however, there were no wound healing issues (see image 3).

The average length of stay (LOS) for patients receiving standard film dressings was 12.5 days compared to patients receiving PICO with a reduced LOS of 5.4 days – a substantial reduction of seven days.

Results: 2nd set of data:

<table>
<thead>
<tr>
<th></th>
<th>Total cases</th>
<th>Standard film dressing</th>
<th>PICO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
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<td>126</td>
<td>84</td>
<td>42</td>
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<td>Diaper</td>
<td>126</td>
<td>84</td>
<td>42</td>
</tr>
<tr>
<td>Healing problems non SSI</td>
<td>126</td>
<td>84</td>
<td>42</td>
</tr>
<tr>
<td>Average LOS (days)</td>
<td>10.2</td>
<td>5.4</td>
<td></td>
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</tbody>
</table>

204 patients were managed with standard film dressings with a 9.6% rate of SSI with 2 patients suffering an SSI at the donor site and 2 experiencing the same issues at the sternal incision site.

In comparison there were no incidences of SSI or any wound healing problems experienced at both the donor and sternal site with PICO (n=21).

Discussion and Conclusion

The use of PICO had a positive effect on outcomes for those patients at highest risk for no complications at either incision site.

The positive results from the first data set were so compelling that a care pathway was developed (image 4) and implemented throughout the Cardiothoracic Unit ensuring high risk patients undergoing CABG surgery had sternal and donor incision site managed with PICO.

The introduction of the pathway has standardized the management of such high risk patients and essentially demonstrated consistency in preventing SSI’s and reducing the length of hospital stay and associated costs whilst utilising PICO.

References

2. Negative pressure wound therapy for management of the surgical incision in orthopaedic surgery Bone Joint Res 2:276–84
3. Negative pressure wound therapy: Incision Management in high risk Cardiothoracic patients – reducing surgical site infection and length of stay
4. £800 590173 or advice@smith-nephew.com
5. Smith & Nephew Product Advice Line:
   - Bleep: 5933 or Mobile: 07977 620454
6. Contraindications for Negative Pressure Wound Therapy
   - Pleural, mediastinal or chest tubing drainage
   - Emergency airway aspiration
   - Do not use on necrotic tissue with eschar present.
   - Do not use on patients with non-enteric and unexplored fistulas.
   - Do not use on patients with malignancy in the wound bed or conditions such as osteomyelitis.
   - Do not use PICO if any of the contraindications for PICO use are applicable.

PICO Pathway

This poster was presented at Wounds UK, Harrogate November 2015.