Innovative solutions to reduce surgical site infection and length of stay in high risk Cardiothoracic patients

Donna Rodden, Surgical Site Infection Nurse, Cardiothoracic Department, Hammersmith Hospital, Imperial College Healthcare London
Trish Dickinson, Clinical Specialist, Wound Management, Smith & Nephew, Hull UK
Anna Taylor, Clinical Project Manager, Wound Management, Smith & Nephew, Hull UK

Introduction

A surgical site infection (SSI) may range from a spontaneously limited wound discharge within 7-10 days of an operation to a life-threatening post-operative complication, such as a sternal infection after heart surgery. Such infections account for approximately 16% of all hospital acquired infections and are estimated to double the length of post-op hospital stay and significantly increase the cost of care.

Advances in surgery and anaesthesia have resulted in patients who are at higher risk of developing an SSI being considered for surgery and in open Cardiothoracic surgery, the mortality associated with deep sternal infections is substantial with as many as 33% of patients dying within a year of the occurrence of an infection.

In July 2008 a Surgical Site Infection Surveillance Scheme (SSISS) was launched by the Health Protection Agency (Public Health England). This enabled participating hospitals to generate reports of their data and compare their rates of SSI against a benchmark.

In 2011, the Imperial College Cardiothoracic Surgery Unit found their SSI rate to be significantly higher than the national average (up to 15% compared with 4.5%). Changes to practice were reported of their data and compare their rates of SSI against a benchmark.

The SSI Nurse found that around 97% of all SSI incidences occurred in the high risk patient group, mostly in diabetic patients and those with a high BMI - with the SSI rate being up to 18% in the high-risk group.

Method

Working with the SSI Nurse, a Cardiothoracic surgeon agreed to evaluate the effect of using PICO as the post-operative management for those CABG patients presenting with a high risk of potential healing problems.

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

An infection of the sternal wound can cause devastating consequences and from the author’s experience the leg donor site frequently suffers with wound healing issues often resulting in an extended length of hospital stay in high-risk patients.

PICO is a battery operated device which delivers continuous Negative Pressure Wound Therapy (NPWT) at -80mmHg. PICO is a single use, disposable device designed to manage surgically closed incisions and has been shown to significantly reduce SSI incidences compared to a standard dressing.

In 2014, a total of 162 patients presented for CABG surgery with twenty one of these patients considered high risk and therefore managed post-operatively with PICO.

Results

The results are summarised in the table below:

<table>
<thead>
<tr>
<th>May-Dec 2014</th>
<th>Standard Dressing</th>
<th>PICO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total cases</td>
<td>144</td>
<td>21</td>
</tr>
<tr>
<td>Total SSI</td>
<td>8 (5.7%)</td>
<td>0</td>
</tr>
<tr>
<td>Sternum</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Donor</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>Healing problems non SSI</td>
<td>38 (26.9%)</td>
<td>0</td>
</tr>
<tr>
<td>Sternum</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Donor site</td>
<td>37</td>
<td>0</td>
</tr>
<tr>
<td>Average LOS (days)</td>
<td>12.5</td>
<td>5.4</td>
</tr>
</tbody>
</table>

In the group of patients managed with conventional dressings post-operatively (n=141), there was a 5.7% rate of SSI with five patients suffering wound healing problems at the donor site and three experiencing the same issues at the sternal incision site. The consequences of such have significant implications for the patient, clinician and related hospital resources as further surgery may sometimes be necessary, an increased hospital stay: potential return to theatre; additional use of dressings and nursing time; distress to the patient.

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

Wound healing challenges (not related to the conventional dressing group occurred in 38 patients-one of which was at the sternal site (see image 2) and 37 at the donor site (see image 3) thus illustrating the challenge post-operative concern. Such challenges at the leg donor sites mainly reflected the management of exudate levels from ‘leaky legs’ (see image 3). In the PICO group of patients however, there were no wound healing issues (see image 4).

The average length of hospital stay for patients receiving conventional dressings was 12.5 days in comparison to patients receiving PICO having a reduced hospital stay of 5.4 days - a significant reduction in hospital stay of seven days. To illustrate this, a bed on the cardiothoracic unit costs £550 per night thus demonstrating an initial saving of £3850 per patient for hotel costs alone.

Discussion/Conclusion

The introduction of PICO NPWT has had a positive effect on outcomes for those patients at highest risk of developing problems with wound healing post-operatively. No complications of SSI or wound healing issues at either incision site were experienced when PICO was utilised.

The positive effects are so compelling that the SSI Nurse developed a care pathway (see image 5) to ensure that all high risk patients undergoing CABG surgery have both the sternal and donor site incision sites managed with PICO.

This pathway is currently being implemented throughout the Cardiothoracic Unit and is expected to provide even stronger data in the future to further demonstrate the effectiveness of incision management with PICO.

References

1. MOUS 2003 Surgical Site Infection https://www.mrcs.org.uk/guidelines/ntchap5/introduction

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