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

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Introduction

A surgical site infection (SSI) accounts 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[1].

Advances in surgery and anesthesia have resulted in patients who are at higher risk of developing an SSI being considered for surgery[2]. In open Cardiothoracic Surgery, the mortality associated with deep sternal infections is substantial[3].

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 incision[3] which has been found to reduce the incidence of wound infection post sternotomy in high risk obese patients[4].

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:

May-Dec 2014	Standard Film Dressing	PICO
Total cases	141	21
Total SSI	8 (5.7%)	0
Sternum	3	0
Donor	5	0
Healing problems non SSI	38(26.9%)	0
Sternum	1	0
Donor site	37	0
Average LOS (days)	12.5	5.4

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 thus illustrating 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:

Jan-May 2015	Standard Film Dressing	PICO
Total cases	204	21
Total SSI	4 (1.96%)	0
Sternum	2	0
Donor	2	0
Healing problems non SSI	10 (4.9%)	0
Average LOS (days)	10.2	5

204 patients were managed with standard film dressings with a 1.96% 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).

10 patients experienced wound healing challenges with a standard film dressing compared to no patients having any wound issues in the PICO group.

The average LOS for patients receiving standard film dressings was 10.2 days compared to patients receiving PICO with a reduced LOS of 5 days - another substantial reduction of five days.

Overall, in eleven months 42 high risk patients received PICO and did not experience an SSI or wound complication with an average LOS of 5 days.

From an overall total of 345 non-high risk patients, 60 patients suffered an SSI or wound complication with an extended average LOS of 11.1 days. The inpatient costs on the cardiothoracic ward are approximately £550 per day so the additional days for such patients with post-operative complications amount to £366,300 in hotel costs alone.

Image 1: A sternal incision site *(standard film dressing)* that developed wound healing challenges

Image 2: A leg donor site *(standard film dressing)* which broke down nine days post-op

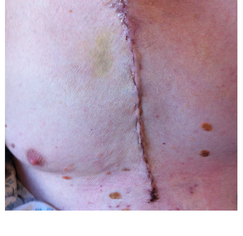

Image 3: Example of a sternal incision site post PICO

Discussion and Conclusion

The use of PICO had a positive effect on outcomes for those patients at highest risk with 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 sternum 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 utilizing PICO.

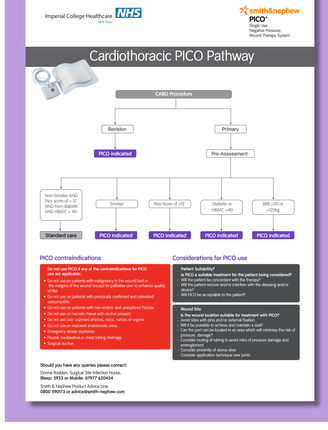

Image 4: Imperial College Healthcare - Cardiothoracic PICO Pathway

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

References
1 Protocol for Surveillance of Surgical Site Infection 2013 Public Health England Surgical Site Infection Surveillance Service Version 6
2 NICE 2008 Surgical Site Infection https://www.nice.org.uk/guidance/cg74/chapter/introduction
3 Karlakki S Brem M Giannini S Khanduja V Stannard J Martin R 2013 Negative pressure wound therapy for management of the surgical incision in orthopaedic surgery Bone Joint Res 2:276–84
4 Grauhan O Navasardyan A Hofmann M Muller P 2012 Prevention of post sternotomy wound infections in obese patients by negative pressure wound therapy. The Journal of Thoracic and Cardiovascular Surgery 145(5):1387-92