Prophylactic use of PICO™ Negative Pressure Wound Therapy to reduce surgical site infections following large bowel surgery

J.F. Caswell MBBS, S. Graham MBBS, P.A. Whitehouse MBBS MD FRCS

Department of General, Endoscopic & Laparoscopic Colorectal Surgery, Worthing Hospital, Worthing, West Sussex, BN11 2DH, UK

Introduction

Surgical Site Infections (SSI)

- SSIs account for 16% of all hospital acquired infections
- Highest rates of infection occur following large bowel surgery
- SSIs are associated with increased morbidity and ~15% increase in mortality
- Large bowel SSIs are classified as superficial, deep incisional and organ space

Negative Pressure Wound Therapy (NPWT) for closed incisions

- NPWT has become an established therapy for wound management although its efficacy and cost effectiveness remains uncertain
- NPWT has a multifactorial mechanism of action (see Figure 1)

Methods

- Adult patients undergoing laparotomy with a high risk for wound complications based on established risk factors (see Figure 3)
- May-November 2014
- Prospective data collection
- Specifically designed proforma
- Wounds closed in usual manner with PICO™ applied under sterile conditions in theatre
- Data compared to same period in 2013

Results

- In the PICO™ study period (May-November 2014), 102 laparotomies were performed, of which 2 patients developed superficial or deep incisional SSIs (1.96%)
- In the control period (May-November 2013), there were 9 superficial or deep incisional SSIs in 119 laparotomies (7.69%)
- The reduction in SSIs is statistically significant, p=0.049 (Fisher's exact test)

Discussion

- The aims of the study were met
- The rate of superficial and deep incisional SSIs was reduced by almost 75% without any other significant change in practice apart from the use of the PICO™ NPWT system in high risk wounds
- The financial impact of this reduction is significant (see Financial Impact Matrix opposite)
- PICO™ is a safe, comfortable and user-friendly system to apply NPWT to laparotomy wounds
- In this small study, the use of PICO™ NPWT has been shown to be beneficial in reducing the rate of superficial and deep incisional SSIs following large bowel surgery

Figure 1: NPWT mechanisms of action

- PICO™ (Smith & Nephew, UK) is a novel self-contained NPWT system that can be applied to open wounds, closed surgical incisions and skin grafts (see Figure 2)

Figure 2: PICO™ specifications

- Cleaner-free
- Negative pressure of 80mmHg
- 7 day therapy
- Comfortable silicone dressing
- 8 sizes (10x20cm to 25x25cm)
- 30mln total exudate capacity

Figure 3: Study inclusion criteria

- Age > 70 years
- BMI > 35
- Emergency operation
- Diabetes
- Immunosuppression or immunocompromise
- Consultant-based decision

Figure 4: SSI rate between Control Group and Study Group

- The rate of superficial and deep incisional SSIs in 119 laparotomies (7.69%)
- The rate of 119 laparotomies (40.7%)
- The reduction in SSIs is statistically significant, p=0.049 (Fisher's exact test)

Figure 5: Analysis of PICO™ patients

- Number with PICO™: 27/102 (26.5%)
- Number superficial/deep SSIs with PICO™: 1/27 (3.7%)
- Cost analysis of PICO™
- 1 PICO™ = £120 + VAT
- All laparotomies (102) = £12,240
- High risk cases ~ £6,480
- Used (27 cases) = £3,240

Financial Impact Matrix

- Tanner et al estimates the average cost of an SSI following large bowel surgery to be ~£110,000
- Potential saving £45,760

Cost of 1 SSI = 70 PICO™ NPWT systems

Based on a cost price including VAT (£144/unit)

In other words, your Trust would remain cost neutral if the use of 70 PICO™ NPWT systems prevented just one superficial or deep incisional SSI

Additional references for Figure 1 can be provided on request

References