Clinical experience with prophylactic use of PICO® Single Use Negative Pressure Wound Therapy System (sNPWT) in cardiothoracic surgery

Aim and key learnings

Prophylactic use of PICO sNPWT in cardiothoracic surgery to help reduce the incidence of surgical site complications (SSCs) and ultimately help reduce costs compared with standard dressings was the focus of an educational event held in March 2019.

Healthcare professionals from the cardiothoracic speciality were convened with the aim of:

- Improving their understanding about how NPWT may work
- Discussing the complications that can be associated with cardiothoracic wounds
- Reviewing the costs associated with SSCs, particularly surgical site infections (SSIs)
- Identifying which patients are most likely to benefit from prophylactic use of PICO sNPWT
- Sharing experiences of using PICO sNPWT in patients undergoing cardiothoracic surgery

The presentations summarised in this report will help to demonstrate benefits of prophylactic use of PICO sNPWT over standard dressings, in high-risk cardiac patients:

- Reductions in SSIs
- Reduced length of stay
- Estimated cost savings

Continued P2 >>
Evidence in focus (continued)

Mechanism of action for NPWT and PICO® sNPWT

Dr Fernando Rodríguez Serrano from the University of Granada, Spain, reviewed the mechanisms of action associated with NPWT. He spoke about early studies evaluating negative pressure as a potential treatment for wounds, and its effects on promoting cell migration and the formation of granulation tissue, as well as describing its effects on improving blood flow, regulating perfusion and controlling exudate. He also reviewed evidence about its effects on bacterial burden, and the concentrations that antibiotics can reach in wounds.

Benefits of PICO sNPWT in high-risk surgical patients

Dr Vicki Strugala from Smith+Nephew, UK, summarised advice from the National Institute for Health and Clinical Excellence (NICE) in the UK about the use of PICO sNPWT to help prevent and treat SSIs. The guidance states that additional costs of using PICO sNPWT compared with standard dressings might be offset due to savings from reducing the incidence of SSIs. She continued by reviewing guidance from the World Union of Wound Healing Societies (WUWHS), which highlights that:
- More than half of SSIs can be prevented
- SSI incidences can vary with surgery type
- Use of NPWT is an option for patients where the consequences of SSCs are high

She also mentioned World Health Organization recommendations that prophylactic NPWT is an option to help prevent SSIs in high-risk patients after consideration of its impact on resources.

Dr Strugala went on to review her recent meta-analysis of PICO sNPWT in surgically closed incisions. Prophylactic use of PICO sNPWT helped to significantly reduce the incidence of SSIs by 58% compared with standard care in 16 studies of 1,839 patients with 2,154 surgical incisions (p<0.0001). Use of PICO sNPWT also helped to significantly reduce surgical dehiscence by 26% compared with standard care in six studies of 1,068 patients with 1,291 incisions (p<0.001).

A beneficial effect on reducing hospital length of stay (LOS) by 0.47 days was also demonstrated from using PICO sNPWT in eight studies involving 725 patients (Figure 1). An update to this meta-analysis contributed to the guidance from NICE supporting use of PICO sNPWT in high-risk patients.

Cost benefits of PICO sNPWT in cardiac surgery patients

The PICO sNPWT meta-analysis included studies in cardiothoracic patients, specifically one study by Witt-Majchrzak et al. in coronary artery bypass graft (CABG) patients. This study was included in a presentation by Leo Nherera from Smith+Nephew, UK, who explained the principles behind allocation of resources in healthcare systems.

He used results from this Polish study of PICO sNPWT in patients with closed sternotomy wounds, and a German study of 2,621 CABG patients, in a health economic analysis conducted from the German payer perspective. PICO sNPWT was estimated to have helped avoid more SSCs than standard dressings (0.989 vs 0.952) and to have helped provide an estimated cost saving of €586 per patient (€19,986 vs €20,572).

Mr Nherera summarised by stating that use of PICO sNPWT was estimated to have been cost saving and resulted in fewer SSCs in specific high-risk patient subgroups such as those with high BMI (>30kg/m²), patients with diabetes and smokers.
**PICO™ sNPWT in high-risk cardiac surgery patients**

Dr Victor Mosquera Rodriguez continued the theme of NPWT cost effectiveness in cardiac surgery patients. He listed some common risk factors that affect the decision to use prophylactic NPWT in patients undergoing cardiac surgery, including:

- High BMI (>30 kg/m²)
- Diabetes
- Smoking
- American Association of Anaestheologists (ASA) score ≥3
- Steroid use

WUWHS guidelines on use of NPWT on closed incisions recommend use of prophylactic NPWT in patients with ≥1 major risk factor for SSCs (extremes of BMI, uncontrolled type 1 diabetes and renal dialysis) and those with ≥2 intermediate risk factors for SSCs, as well as all patients undergoing heart and lung transplants. He commented that prophylactic NPWT should be considered for all at-risk patients undergoing cardiac surgery.

Dr Mosquera Rodriguez went on to present results of a study evaluating the incidence of SSIs using PICO sNPWT (n=187) and standard dressings (n=175) after CABG surgery at his hospital in Spain. The incidence of SSIs within 30 days of surgery was lower with PICO sNPWT than with standard dressings (5.9 vs 10.9%). Mean LOS after diagnosis of an SSI (17.1 vs 22.1 days), and mean duration of antibiotic use (29.7 vs 31.9 days) were both reduced for patients who received PICO sNPWT compared with standard dressings (Figure 2).

Dr Mosquera Rodriguez summarised by stating that the overall cost of treatment was approximately halved with prophylactic use of PICO sNPWT compared with standard dressings (Figure 2) due to:

- Reductions in the incidence of SSIs
- SSIs that did occur being easier to manage
- Reductions in LOS and antibiotic use
- A reduced need for further NPWT at a later stage

He concluded by saying that PICO sNPWT was readily accepted by patients and surgeons and that he believed it to be a cost effective option in this high-risk patient group.

**Real-world experience with PICO sNPWT – sternotomy patients**

Dr Rafael Llorens shared his experience of using PICO sNPWT to help reduce the incidence of SSIs in high-risk sternotomy patients. He presented data from Hospiten Rambla in Tenerife, Spain, from 314 consecutive patients undergoing sternotomy who received either PICO sNPWT (Fowler score ≥7; n=207) or standard care (Fowler score <7; n=107) over a 9-month period in 2016.

The incidences of early and late infections were lower with PICO sNPWT than with standard care (1.4 vs 4.6% and 0.9 vs 1.8%, respectively). Furthermore, there were no cases of mediastinitis or dehiscence in the PICO sNPWT group compared with one case of mediastinitis and two cases of sternal dehiscence with standard care.

Dr Llorens presented total cost data from the first 100 patients showing that the overall cost of care was €84,460 with standard dressings (n=34) and €15,018 with PICO sNPWT (n=66) – a reduction of €69,442. In patients with SSIs, use of PICO sNPWT helped to provide a cost saving of €2,042 per patient compared with standard dressings.

He concluded by stating that in his experience, prophylactic NPWT used over closed incisions helped to reduce post-operative SSIs in sternotomy patients and was cost effective.
Reducing the cost of SSCs using PICO sNPWT

The final presentation was given by Dr Albert Tabley from the Charles Nicolle Hospital, Rouen, France. He shared his concerns about the threat of antibiotic resistance and the increasing pressures on healthcare providers to reduce hospital LOS and overall management costs.

He presented data from a prospective real-world study conducted at his hospital that evaluated prophylactic use of PICO sNPWT (n=142) against standard dressings (n=91) in patients undergoing median sternotomy surgery with at least two risk factors for SSCs.

The results showed that PICO sNPWT helped to reduce the incidence of superficial SSIs compared with standard care (2.1 vs 3.3%) and significantly reduced the incidence of mediastinitis (3.5 vs 11.0%, p=0.029; Figure 3). Furthermore, LOS was much lower in patients who did not have SSIs compared with those who did (11.5 vs 21.4 days; Figure 4); the daily cost of an inpatient stay was estimated to be €1,216.

Overall, for 100 patients, prophylactic use of PICO sNPWT was estimated to provide cost savings of €129,461 compared with standard care (€1,485,630 vs €1,615,091) due to reductions in the incidence of SSCs and associated LOS.

In conclusion, he stated that prophylactic use of PICO sNPWT helped to reduce the incidence of SSIs and mediastinitis, and is cost effective in high-risk cardiac patients.
Evidence in focus (continued)

Summary of evidence

Healthcare providers are under increasing pressure to reduce the cost of treatment and hospital LOS, in part through preventing SSCs in cardiothoracic surgery. The above studies of PICO® sNPWT in patients undergoing cardiothoracic surgery have shown:

- Reductions in SSCs versus standard care, including superficial SSIs and mediastinitis.
- Substantial reductions in hospital LOS.
- Cost savings in patients with SSIs, in part, from reduced LOS and antibiotic usage, and a reduced need for later NPWT.

Prophylactic use of PICO® sNPWT in cardiothoracic patients in these studies from France and Spain demonstrated that it was a cost-effective option to help prevent SSCs in high-risk patients.

For more information about the use of PICO® sNPWT in patients with closed surgical incisions, please visit the Education and Evidence website: http://www.smith-nephew.com/education/

For detailed product information, including indications for use, contraindications, precautions and warnings, please consult the product’s applicable Instructions for Use (IFU) prior to use.

References:
7. Strugala V. Guidance and evidence to support prophylactic use of PICO® sNPWT in closed surgical incisions. Presentation at the Cardiothoracic Surgery Course, March 13–15, 2019; Santiago de Compostela, Spain.