

# Reducing Pressure Injuries in the Surgical Cardiovascular Patient Population

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## Problem

The Cardiac Surgery ICU (CICU) hospital-acquired pressure injury (HAPI) 12 month incidence rate remained above benchmark at 8.7% despite implementation of a pressure injury prevention (PIP) bundle.

## Background

Hospital-acquired Pressure Injury (HAPI) incidence in cardiac surgery patients is reported to be as high as 29.5%.<sup>1</sup> OR-related pressure injury rates are reported between 4-45%.<sup>2</sup> The heels and the sacrum are the highest anatomical location for OR-related pressure ulcers.<sup>2</sup> Numerous factors related to the peri-operative period put surgical patients at risk including prolonged immobility during the perioperative period, hypothermia, hemodynamic changes, vasopressor administration and numerous lateral transfers resulting in shearing force.<sup>2,3</sup> Studies on cardiac surgery patients consistently show a higher incidence of pressure injury.<sup>4</sup> This may be due to several factors such as continued use of vasopressors and mechanical ventilation postoperatively, limited turning due to cardiovascular instability, heart failure and vascular disease.<sup>4</sup> (See Table 1 - Risk Factors for Pressure Injury Development in Cardiac Surgery Patients.)

Previous projects at this 571 bed academic medical center implemented a 5 layer prophylactic silicone dressing on high risk patients in 2 different ICU settings, resulting in a 64% and 24% reduction in the SICU and MRICU units from 2009-2013. Subsequently, in late 2014, the NPUAP recommended the use of a foam prophylactic dressings in the new guidelines revisions based on a randomized controlled trial demonstrating effectiveness at reducing pressure injury incidence.<sup>2,5</sup>

Based on our own experience as well as advances in the evidence backing of prophylactic dressings, we instituted a quality improvement project to extend the application of the 5-layer soft-silicone foam dressing to the sacrum and heels of all cardiac surgery patients preoperatively and to continue its use throughout the patient's time in the OR and the ICU.

## Selecting the Patients

All patients undergoing cardiac surgery procedures were considered to be high risk. A total of 65 patients were followed from September through December 2014. (See Table 2 - Patient Demographics).

Table 2: Patient Demographics

Patient Demographics
65 Patients
34 Male / 31 Female
Ages: 42-88 years
Average CICU LOS: 7.1 days (range 1-43 days)

Temple University Hospital Staff



## The Process

- All nursing staff were educated on the project
- All cardiac surgery patients had the 5-layer soft silicone foam dressings applied to their sacrum and heels prior to their surgical procedure
- A structured skin assessment ensured that the dressing was applied and checked daily (see figure 2)
- Following surgery, dressings were changed every three days or PRN
- The dressings remained in place throughout the patients stay in the unit
- Skin assessments were performed every shift
- Other PIP bundle components remained in effect included: off-loading, nutritional support, specialty beds, re-positioning, and moisture management

Table 1: Cardiac Surgery Patient and Surgery Specific Risk Factors for PI Development

Risk Factors: Surgical Procedure <sup>4</sup>
Greater number of co-morbidities
Low Blood pressure (mean, systolic or diastolic)
Extracorporeal circulation
Duration of surgery over 3-4 hours
Rapid temperature changes
Presence of Intra-aortic balloon pump
History of vascular disease
Use of vasopressors
Mechanical ventilation
'Too unstable to turn'
Longer length of stay in ICU
Sedatives
Peripheral Vascular Disease
Heart failure
Long wait before surgery
Use of antihypertensive drugs
Steroid therapy
Hospital and/or ICU Readmission
Edema
Smoker
More than 1 surgery
Poor nutritional status

Figure 2: Documentation Flowchart: Prophylactic Dressing Evaluation

Cardiac Surgery Skin Breakdown Prevention Trial		
Patient Name	_____	
Patient Room #	_____	
Patient Medical #	_____	
Patient Diagnosis	_____	
Admin Date:	_____	
<b>OR/ICU</b>		
1	Patient's skin assessed for signs of skin breakdown pre-op and documented	Y/N DATE
2	Dressing applied to sacrum and heels AND DATED	
<b>CICU</b>		
1	Patient's skin assessed for signs of breakdown post-op and documented	Y/N DATE
	Post-Op	
	24 Hrs Post-Op	
	48 Hrs Post-Op	
	72 Hrs Post-Op	
	Describe any breakdown	DATE
2	Dressing changed every 3 days AND DATED	
3	Patient placed on specialty bed as needed	Y/N DATE
	If yes, type	
4	Dressings maintained on sacrum and heels throughout CICU stay	
5	Patient developed skin breakdown during CICU stay	
	If yes, describe	
***VERY IMPORTANT***		
PLEASE CHECK SKIN AND DOCUMENT PRIOR TO DISCHARGE FROM UNIT		
PLEASE RETURN TO BIN AT FRONT DESK WHEN PATIENT IS DISCHARGED		
Comments:		

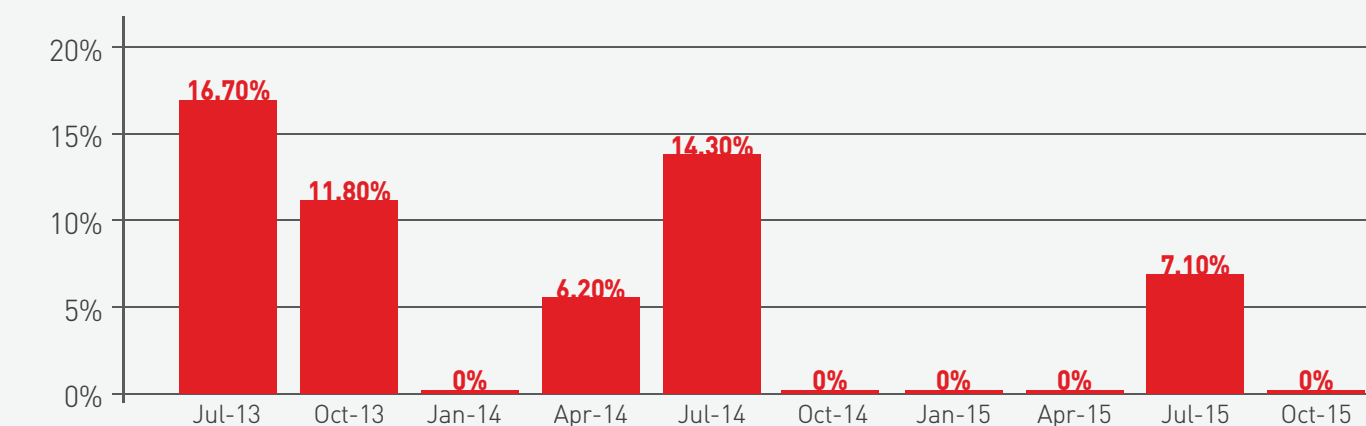
## Conclusion

In conclusion, use of prophylactic dressings was expanded to include the peri-operative period on cardiac surgery patients and on the sacrum and heels of all CICU patients resulting in a dramatic reduction in pressure injuries in this very high risk population. Pre-operative application of the dressings is being expanded to select neurosurgery and orthopaedic surgery populations, with plans to implement on all high risk pre-operative patients.

## Findings

Sixty five patients were followed from September through December 2014. During that time, one patient, an artificial heart recipient, developed a sacral deep tissue injury immediately post-op which resolved prior to discharge. Subsequently, 1 pressure injury was noted in quarterly incidence studies over the next 15 months. That patient was an end-of life patient who experienced total body skin breakdown and expired soon after developing the pressure injury. (See Figure 1)

Figure 1



## CITATIONS

- Feuchtinger J, Halfens R, Dassen T. Pressure ulcer risk factors in cardiac surgery: a review of the research literature. *Heart Lung*. 2005;34(6): 375-85.
- National Pressure Ulcer Advisory Panel, European Pressure Ulcer Advisory Panel, and pan Pacific Pressure Injury Alliance. *Prevention and Treatment of Pressure Ulcers: Clinical Practice Guideline*. Emily Haesler (ED.) Cambridge Media: Perth, Australia; 2014. Pg 77-78.
- Munro C. The development of a pressure ulcer risk-assessment scale for perioperative patients. *AORN J*. 2010 Sep;92(3):272-87.
- Rao A, Preston A, Strauss R, et al. Risk factors associated with pressure ulcer formation in critically ill cardiac surgery patients; a systematic review. *J Wound Ostomy Continence Nurs*. 2016;43(3):1-6.
- Santamaria N, Gertz M, Sage S, et al. A randomised controlled trial of the effectiveness of soft silicone multi-layered foam dressings in the prevention of sacral and heel pressure ulcers in trauma and critically ill patients: the border trial. *Int Wound J*. 2013. DOI: 10.1111/wj.12101.