EFFECT OF FLUID IMMERSION SIMULATION* OR TABLE PADS ON PRESSURE ULCER PREVENTION IN CARDIAC SURGICAL PATIENTS: EARLY RESULTS

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ABSTRACT

Problem: Between 9/2/2012 and 6/2013, our quarterly pressure ulcer (PU) prevalence surveys demonstrated that one (4.3%) to five (23%) patients with PU per quarter had undergone cardiac surgery (CS). Length of surgery ranged from three to cumulative 16 hours during multiple surgical procedures.

Background and Significance: Our results are consistent with published reports of higher PU incidence for CS patients of up to 29.5%. Risk factors include duration of immobilization on the OR table, older age, temperature manipulation, vasoactive drugs, hypotensive periods, and reduced hemoglobin and hematocrit levels. Novel approaches to prevent PU from prolonged immobilization include Fluid Immersion Simulation (FIS) OR Pad – a pressure redistribution surface pad that uses a patented microprocessor and dynamic waveform analysis software to adjust internal air density based on mass and surface area. The end result is a support medium with less molecular density than the supported body, maintaining normal tissue symmetry. Studies demonstrate preservation of 87% of baseline microvascular blood flow on FIS Pad versus 16% on static OR table pads. Objective: To determine whether the FIS OR Pad reduces PU incidence following CS. Implementation: From 9/1/2013 to 11/30/2013, FIS OR Pads were placed continuously on the four CS OR tables. Results: 398 patients underwent CS on the FIS OR Pad, including 230 men (58%). Ages ranged from 24 years to 88 years (mean: 63 years.) Surgeries included coronary artery bypass graft (CABG) (28%), aortic valve replacement (AVR) (13%), mitral valve replacement (8%), thoracic aortic procedures (2.2%), CABG plus VR (4.5%), lung transplant (1%), heart transplant (0.5%). Duration of the procedures was shortest for AVR (1.0%) and longest for thoracic aortic repair (in the series, the incidence of new pressure ulcers was 0%). Conclusion: The FIS OR Pad is effective at preventing tissue deformation and deep tissue injury (DTI) in a subset of patients who are at very high risk of PU.

RISK FACTORS FOR PU DEVELOPMENT IN CARDIAC SURGICAL PATIENTS

- Extended time/imobilization on the OR table
- Older age
- Extracorporeal circulation
- Temperature manipulation
- Vasoactive drugs
- Hypotensive periods
- Reduced hemoglobin and hematocrit levels

CONCLUSION

This patient series suggests that the FIS OR Pad is effective at preventing tissue deformation and consequent deep tissue injury in a subset of patients who are at very high risk of PU.

IMPLICATIONS

- Practice
  - Expand use of FIS OR Table Pad to other patients at high risk of perioperative deep tissue injury
- Research
  - Conduct comparative effectiveness trial(s) comparing the FIS OR Table Pad with other pressure relieving OR table pads/products/strategies

REFERENCES


PERFORMANCE IMPROVEMENT PROJECT

Objective: Determine whether novel pressure-relieving Fluid Immersion Simulation (FIS) OR Table Pads reduce the incidence of perioperative HAPU among patients undergoing cardiac surgery (CS)

Timeline: September 1, 2013 through November 30, 2013

RESULTS

(N=398)

Type of Surgery Percentage
Coronary Artery Bypass Graft (CABG)* 28.0%
Aortic Valve Replacement (AVR) 13.0%
Mitral Valve Replacement 8.0%
Thoracic Aortic Procedure** 7.2%
CABG plus VR 4.5%
Lung Transplant 1.0%
Heart Transplant 0.5%
Incidence of HAPU: 0%

Fluid Immersion Simulation (FIS) O.R. Table Pad

Fluid Immersion Simulation™ (FIS)™

- A state of the art pressure redistribution technology
- An advanced microprocessor-driven system
  - analyzes the pressure waveform generated by the patient while sinking into the mattress surface
  - then, precisely adjusts air density in the mattress to simulate immersion in a fluid medium.
- Mimics floating in water and dynamically reduces undesired soft tissue deformation.

Questions? Contact vcapasso@partners.org

This project was undertaken as a Quality Improvement Initiative at Massachusetts General Hospital, and as such was not formally supervised by the Institutional Review Board per their policies.