

# Optimizing the Post-Operative Care of Spinal Cord Injured Patients Undergoing Flap Surgery for the Treatment of Pressure Ulcers with Fluid Immersion Simulation Technology and Continuous Bedside Pressure Mapping: A Pilot Study

## Background

At any point in time, more than one-third of all spinal cord injury patients have a pressure ulcer. Healing pressure ulcers is particularly challenging in this population. In full thickness pressure ulcers with significant tissue loss, myocutaneous and fasciocutaneous flaps have become the standard of care for achieving closure.

In order to optimize flap healing in these patients, a multidisciplinary post-surgical plan of care is necessary to ensure a positive outcome. Along with nutritional optimization and avoidance of pressure and shearing forces over the postoperative flap site, maintaining perfusion is critical to flap viability. The postoperative flap protocol at Select Specialty Hospital Dallas includes an air fluidized bed system, which is costly to rent and provides a number of logistical challenges.

The hospital chose to trial a unique therapeutic support surface technology paired with a real-time pressure mapping system in place of an air fluidized bed system during the immediate post-surgical period for these patients.

## Methods

The facility initiated a pilot study of a unique mattress and wheelchair cushion system incorporating fluid immersion simulation (FIS) technology to replace air fluidized therapy in the post-surgical protocol. A continuous bedside pressure mapping (CBPM) system was added to provide instant real-time feedback to guide caregivers in effective patient positioning, repositioning, and offloading of pressure. The system also provided audible notifications to alert staff when repositioning was due pursuant to the individual patient's turning schedule as outlined in the care plan.

During the 30-day trial, three paraplegic patients, with four ischial pressure ulcers, were placed on the FIS mattress with CBPM system after undergoing flap surgery for ulcer repair, and otherwise received the facility's standard postoperative flap protocol interventions. In conjunction with rehabilitation staff, two patients were able to initiate the postoperative sitting protocol with the FIS wheelchair cushion.

To capture their feedback from the trial, clinicians providing care and rehab services for the post-surgical flap patients completed an evaluation form at the end of the trial period and results were gathered and tallied. They were asked to rate the evaluation criteria by choosing a value from 5 (strongly agree) to 1 (strongly disagree).

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## Outcomes

Three of the four flap surgical incisions were completely closed without complication at four weeks. The fourth incision was 95% closed at four weeks, with full closure achieved shortly after discharge without complication. The photos below depict the surgical flap incisions at Week 1 and Week 4.

### Patient #1 (Right Ischial Flap)



### Patient #2 (Right Ischial Flap)



### Patient #3 (Left Ischial Flap)



### Patient #3 (Right Ischial Flap)



## Clinician Evaluation

The results from the Clinician Survey are summarized below:

5 = Strongly Agree 4 = Agree 3 = Neutral  
2 = Disagree 1 = Strongly Disagree

Evaluation Criteria	5	4	3	2	1	Avg.
The patient's wound(s) improved while on the Dolphin FIS mattress paired with the CBPM system.	6	2	0	0	0	4.75
The Dolphin FIS mattress paired with the CBPM system improved the patient's post-surgical flap care.	7	1	0	0	0	4.87
The Dolphin FIS mattress with CBPM system was easy to use.	6	2	0	0	0	4.75
The patient was comfortable on the mattress system.	6	2	0	0	0	4.75
Our facility would recommend the continued use of the Dolphin FIS mattress paired with the CBPM system.	7	1	0	0	0	4.87

The Clinicians further commented that:

"Patient came in with partial open wounds. Wounds improved through this hospital stay."

"Dolphin mattress/ CBPM systems working well."

"Very helpful in preventing new sores. Very easy to transfer patient (mechanically). Less noise."

"Staining [cover] is not a problem with this bed; ergonomically better for nursing mechanics."

"Patient came in with partial open flap. During hospital stay (in SSH) wound improved."

## Select Specialty Hospital - Dallas

Select Specialty Hospital - Dallas combines the specialized expertise of a large hospital with the personalized attention of a smaller setting. We are a long-term acute care hospital which cares for medically complex patients by providing a diverse mix of highly skilled ancillary and nursing services, comprehensive rehabilitation, chronic respiratory care, pain and wound management services.

At Select Specialty Hospital - Dallas, we are devoted to providing highly specialized and individualized care to all patients. We treat the whole patient - physically, emotionally, and socially. We recognize that having our patients and their families entrust us with their care is a privilege and an opportunity to make a difference in their lives. We are committed to high quality care, mutual respect, accountability, teamwork, and resourcefulness to help us achieve optimal outcomes for our patients.



## Conclusions

Patients undergoing surgical pressure ulcer repair now have a viable alternative option in a therapeutic support surface system to support maintenance of tissue perfusion and optimize the environment for healing.



Dolphin FIS Mattress System

Fluid immersion simulation technology merits further evaluation as a therapeutic surface that supports healing for patients undergoing flap surgery.

Continuous bedside pressure mapping further improved the postoperative care of these challenging surgical patients.

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