Purpose: To evaluate the validity of utilizing a replacement four inch high-density foam cushion (FIHDFC) in the seat hatch of the spinal stabilization table (SST) as compared with using the SST original manufacturer's cushion to reduce the incidence of pressure injury (PI) development in the study population of acute adult Spinal Cord Injury (SCI) patients admitted through the Trauma Center. According to the AHQR (Agency for Healthcare Quality and Research), a government agency, "Pressure ulcers cost $9.1-$11.6 billion per year in the US. Cost of individual patient care ranges from $20,900 to $151,700 per pressure ulcer. Medicare estimated in 2007 that each pressure ulcer added $43,180 in costs to a hospital stay. Lawsuits: More than 17,000 lawsuits are related to pressure ulcers annually." (https://www.ahrq.gov/professionals/systems/hospital/pressureulcertoolkit/putool1.html). With this figure in mind, prevention is the key to promoting patient and family satisfaction in the hospital setting as well as promoting a greater reduction in occurrence of PI development with resulting decrease in financial and litigious losses for the facility. In the long run the act of early PI reduction protocols in the SCI patient are a "win-win" for the patient, their family and the medical facility.

NOTE: The National Pressure Ulcer Advisory Panel (NPUAP in 2016) changed the terms, "pressure ulcer (PU) to pressure injury (PI)." The terms may be used interchangeably throughout the submission depending upon the sources noted in the submission.

Methods: Retrospective study. Data was collected through University of Florida/Department of Research Affairs for 59 months (February 2012-January 2017). The data included forty-nine adult, acute patients admitted through the Trauma Center who sustained an unstable spine and requiring surgical fusion/intervention. Data was compiled, and results were analyzed comparing the regulation SST cushion as compared with the FIHDFC concerning the incidence of pressure injuries developed utilizing these two cushions. Two hospital Intensive Care Units were the study units. The experimental group replaced the original SST seat hatch cushion with the FIHDFC and the control group used the original SST seat hatch cushion from the SST manufacturer.

Results: Forty patients of the original forty-nine patients sustained a complete SCI. Of this population, nine patients utilized the FIHDFC. In the experimental group none of the nine patients developed pressure injuries. The length of time on the SST for the experimental group ranged from two to twenty-seven days; length of time on the SST for the control group was one to thirty-three days. Of the forty patients in the control group, one was dropped from the study due to the presence of a deep tissue injury on admission. There was a total of 39 patients in the control group with 14 of that group developing a PI while on the SST. In the control group 14 of 39 patients developed at least one pressure injury (35.89%). Of the 14 patients developing at least one PI, some occurred as early as within two days of placement on the SST cushion. One of the experimental group patients, a male in his 60's, utilized the replacement FIHDFC surface for 27 days was discharged having developed no PI. However another male also in his 60's (control group) utilized the original SST cushion for 14 days and sustained a deep tissue injury which evolved into a Stage 4 pressure injury. After surgical debridement, his injury progressed to bone exposure resulting in the need for prolonged use of a wound vac application to promote wound closure. The course of litigation was resolved with by an undisclosed amount of funds from the facility.

Conclusion: Utilization of a replacement FIHDFC in the seat hatch of the SST greatly reduces the incidence of PI development in the acute, adult spinal cord injury patient admitted through the Trauma Center with an unstable spine requiring surgery with or without a SCI.
Title:
Comparing the Incidence Rate of Pressure Injury Development in the Acute Adult SCI Patient

Keywords:
Pressure injury, Pressure mapping and Pressure redistribution

References:


Sensor Products Inc. (2018). Tactilus real-time surface pressure mapping technology. Retrieved from http://www.sensorprod.com/tactilus.php?gclid=EAilQobChMr6sannp_f3gI1VYWzCh1xDwQIEAAAAAEgKWg_D_BwE


**Abstract Summary:**

Over a period of 59 months two ICUs were reviewed, comparing the incidence of pressure injury (PI) development for acute adult SCI patients placed onto a spinal stabilization table (SST). Control group used original SST seat hatch cushion, experimental group used a substitute cushion with significant results, zero PI development.

**Content Outline:**

Introduction: *(Background)*

Spinal Cord Injury (SCI) patients have severe, often debilitating injuries regardless of the original mechanism of injury. The research facility demonstrated that the injuries resulting in SCI most often resulted from motor vehicle accidents, all terrain vehicle accidents (ATVs), falls, gunshot wounds, knife wounds, assaults and marine accidents. Males aged 21-30 are noted nationally to be at highest risk for SCI type injuries over females in the same age range. Pressure injuries are the number one complication for SCI patients regardless of age due to their limited mobility.

Immobility has been historically cited as the number one predisposing factor for the development of Pressure Injuries (PI). SCI patients thus have a greater propensity for developing PI; therefore they require a more rapid assessment, intervention and initiation of preventive modalities. Many researchers have noted that PI development in the SCI patient occurred in as brief a time as within the first two hours of initial immobilization after injury.

It is critical that the spinal cord be protected prior to surgery to prevent further impairment or injury prior to surgical repair. Therefore, the acute SCI patient is placed on a spinal stabilization table (SST) to immobilize the spinal column, reducing the risk for further spinal injury. The SST immobilizes the patient's head, neck and entire spinal column with a series of pads, straps and devices for added security. The SST is set to rotate at varying degrees depending on the neurosurgeon's specific orders (10-62 degree rotation). The purpose of rotating the SST is to improve pulmonary function; this aids in decreasing the incidence of pneumonia. When the SST is rotating on a regular basis it is also designed to reduce skin breakdown and the development of PI (off-loading with each turn) of the bed bound patient.

The number of days the patient is on the SST can vary considerably as discussed in this study. Length of time for patients on the SST for the study population ranged from one to thirty-three days. The longer the patient is placed on the SST, the higher the incidence of PI development (in most cases).

Many factors can prolong the time frame that the acute SCI patient is on the SST including:

- **Unavailability of the Operating Room (OR) for surgical repair.** Spinal fusion is a very delicate and an extensive, prolonged surgery. This facility is a Level One Trauma Center and is operational 24/7. Often planned surgical procedures "get bumped," if a life or death trauma situation occurs. This can prolong the patient's time on the SST.

- **Patient develops fever or is septic.** Sepsis must be treated and resolved prior to the patient going to the OR for surgical fusion. At times this resolution may take several weeks to accomplish.
Hemodynamic instability entailing cardiac, respiratory or metabolic issues must all be reconciled and within normal limits for best outcomes in order to prevent or reduce complications post-operatively.

Bleeding dyscrasias can lengthen the time the patient is on the SST. For example, if a patient has been on anti-coagulation therapy prior to the injury/accident, the patient is at higher risk for bleeding postoperatively. These discrepancies must all be factored into the overall surgical plan in order to avoid complications.

These factors must be resolved prior to a patient being taken to the OR to prevent undue complications.

During a 59 month time frame, two Intensive Care Units (ICU) at a major teaching hospital in the southeastern United States with a Level One Trauma Center were surveyed. Forty-nine acute adult spinal cord injury (SCI) patients were studied retrospectively. These two units were reviewed to assess the incidence of (PI) development. There was a control group (SICU-South) that utilized the original manufacturer's spinal stabilization table (SST) seat hatch cushion which was placed under the patient's sacral/coccyx (seat hatch) region. The experimental group (SICU-North) used a four inch high density foam cushion (FIHDFC) as a replacement cushion for the original SST manufacturer's cushion in the seat hatch section of the SST.

Stages of PI developed and number of SST days were reviewed. Comparisons were calculated for both units as well as the incidence of PI developed while on the SST. Data was reviewed and tabulated by our Trauma Psychologist, Dr. David Chesire who also served as our statistician for the study. His remarks were that the findings were "Significant at p<0.05." His statements were regarding the implementation of the FIHDFC as compared with the use of the standard cushion for the seat hatch of the SST.

Figures were calculated from both ICUs. The SICU-South/ control group had 39 patients; one was dropped from the study (originally 40 patients) due to the presence of a deep tissue injury (PI) being present upon admission. Of the 39 patients in the control unit, 14 developed a PI. There were nine patients in the SICU-North, experimental group. Of the nine patients in the experimental group, none of the patients developed a PI. The total percentage of skin breakdown for the control group was 35.89%.

The time of placement on the SST for the South/ Control group ranged from 2-33 days. The length of time for the North/ Experimental group ranged from 1-27 days. Age ranges were comparative accordingly. The patient who spent the most time on the SST in the experimental group was in his sixties; he was on the SST for a total of 27 days due to fever and infection prior to surgery. There was also a patient in his sixties from the control group who was on the SST for only 14 days; during that time he developed a Deep Tissue Injury which evolved to a deep wound with bone exposure after debridement in the OR. His wound was then treated with prolonged Wound Vac Therapy to promote granulation and closure. This was a situation that led to litigation by the patient's family. The course of litigation was resolved by an undisclosed amount of funds from the facility.

Unfortunately, litigation is not the desired outcome but is often expected when PI occur. Many local law firms advertise on television, highway billboards and through radio ads appealing to families whose family member sustained a PI while in the care of healthcare providers in an acute or long term care facility. In 1859 Florence Nightingale stated: "If he has a bedsore, it's generally not the fault of the disease, but of the nursing."

There are many factors to consider when a PI develops:

- Patient discouragement, depression, dissatisfaction with their caregivers and facility, blame and anger

- Family dissatisfaction with caregivers and the facility.
-Reputation of the caregivers and facility

-Legal fallout from the development of PI

-Multi-faceted effects on the facility, staff morale and community awareness of skin breakdown: spread by word of mouth from former patients

-Loss of federal funding due to penalties from CMS (CMS will not cover a Stage 3 or greater PI when it occurs in a facility). The facility where the Stage 3 or greater PI occurs becomes responsible for the cost of the care of the patient with the PI.

However, the results demonstrated that the big picture is a "WIN-WIN!" These wins are for the patient, the family, care givers, the legal team, and the community. Prevention of Hospital Acquired Pressure Injuries (HAPIs) can drain a family and a facility emotionally and financially. Implementation of a (FIHDFC) could save a patient from repeat hospitalizations, loss of body parts/ osteomyelitis, loss of income, lowered self esteem, and multiple financial issues for the family and facility. Implementation of an inexpensive (less than $25) FIHDFC could greatly impact the overall outcome for an acute adult SCI patient in the long run.

During the time of the study an Occupational Therapist, (OT-R) pressure mapped the Primary Investigator utilizing both cushions on the SST. The words of the OT-R, Jennie Barrow were, "You've really got something here." Ms. Barrow operates an outpatient wheelchair clinic for the SCI population in the community. Her primary focus is reducing pressure in the seat areas of the SCI patients by pressure mapping the patients while in their wheelchairs with their pressure relief/re-distribution cushions in place. Her knowledge base allows her to modify the cushions or replace worn cushions to reduce the incidence of PI development in this high risk population.

First Primary Presenting Author

**Primary Presenting Author**

Cynthia Gayle Barney, MSNEd
University of Florida Health-Jacksonville
Professional Practice
Wound/Ostomy Specialist, MSN, RN, CWOCN
Jacksonville FL
USA

Author Summary: 2018-Completed second research project, submitted for presentation at STTI Conference. 2010-Present-Board Certified Wound, Ostomy, Continence Specialist at a major teaching hospital in the S.E. United States. 2012-2018–Wound Treatment Associate Program/ Skills Coordinator/Course Coordinator for staff RNs at our facility. (A program originally developed at Emory University in Atlanta, Georgia). 2015- Chosen as one of two Magnet Presenters for Facility's Magnet redesignation. Presented first IRB approved study at this event.