

CASE STUDY

Quality Improvement Using Support Surfaces Effectively Decreases the Incidence of Hospital-Acquired Pressure Injuries

Alicia Maass, MSN, RN, CCRN, Director of Critical Care
JoAnna L. Dundalow, BSN, RN, CCRN, RN-BC, Assistant Nurse Manager, Critical Care

BACKGROUND

Every year in the United States, approximately 2.5 million acute care patients develop a hospital-acquired pressure injury (HAPI), with patients who are elderly, immobile, malnourished, have poor skin quality, or have extended hospital stays at particularly high risk.^{1,2} Pressure injuries (PIs) are defined as, “any area of skin or underlying tissue that has been damaged because of intense or prolonged pressure in combination with shear”⁵ PIs can occur when a person remains in one position for an extended period of time, even as little as a few hours, without shifting position.³

Although evidence-based HAPI prevention guidelines have been published and broadly disseminated, the estimated incidence increased from 3.6 to 4.8 per 10,000 hospital encounters among critically ill patients between 2013 and 2016.⁴ Recent estimates for

intensive care units (ICUs), specifically, suggest that the HAPI occurrence rate falls between 8.8% and 10.3%.⁵

Hospital acquired pressure injuries can lead to longer hospital stays, chronic wounds, and decreased patient quality of life and have been shown to result in up to 60,000 deaths per year.^{1,2} In fact, when a patient suffers a HAPI, the chances of death during the hospital stay and in the 30 days following hospital discharge increase by 280% and 169%, respectively.¹

In addition to substantial patient harm, HAPIs are also responsible for considerable costs to the healthcare system. Estimates in the United States suggest an annual HAPI-related cost of up to \$26.8 billion, with a single instance of HAPI resulting in a cost ranging from \$20,000 per stay, up to \$151,700.^{1,6,7,8}

¹ Padula WV, Delarmente BA. The national cost of hospital-acquired pressure injuries in the United States. *International wound journal*. 2019 Jun;16(3):634-40.

² Kayser SA, VanGilder CA, Lachenbruch C. Predictors of superficial and severe hospital-acquired pressure injuries: A cross-sectional study using the International Pressure Ulcer Prevalence™ survey. *International journal of nursing studies*. 2019 Jan 1;89:46-52.

³ Haesler E. National pressure ulcer advisory panel, european pressure ulcer advisory panel and pan pacific pressure injury alliance. *Prevention and treatment of pressure ulcers: quick reference guide*. 2014:14-32.

⁴ Padula WV, Black JM, Davidson PM, Kang SY, Pronovost PJ. Adverse effects of the Medicare PSI-90 hospital penalty system on revenue-neutral hospital-acquired conditions. *Journal of patient safety*. 2020 Jun 1;16(2):e97-102.

⁵ Amirah M, Rasheed A, Parameaswari P, Awajeh A, Issa M, Abdallah M. Pressure injury prevalence and risk factors among adult critically ill patients at a large intensive care unit. *J Intensive Crit Care*. 2019;5(2):9.

⁶ Agency for Healthcare Research and Quality, Rockville, MD. Are we ready for this change? Last reviewed in October 2014. Retrieved from <http://www.ahrq.gov/professionals/systems/hospital/pressureulcertoolkit/putool1.html>

⁷ Braden, B. Costs of pressure ulcer prevention. Is it really cheaper than treatment? National Pressure Ulcer Advisory Panel [Power Point slides]. Retrieved from <https://www.npuap.org/wp-content/uploads/2012/01/Braden-NPUAP-cost-vs-prevention-final.pdf>

⁸ Spetz et al. (2013). The value of reducing hospital-acquired pressure ulcer prevalence. *The Journal of Nursing Administration*, 43(4)

OBJECTIVES

The primary objective of this initiative was to decrease the number of HAPIs leveraging new technology,⁹ hereinafter referred to as “Stryker beds.”

METHODS

Clinical Setting: This case study was performed in an adult intensive care unit (ICU) and an adult cardiovascular ICU (CVICU), comprised of 28 total beds (14 ICU, 14 CVICU).

Stryker Surface and Frame Technology: Stryker’s Isolibrium surface utilizes exclusive air pod technology to provide patient specific immersion and envelopment by taking into account the patient’s weight range, position changes, as well as frame articulation changes. – Isolibrium’s air channeling technology delivers low-air-loss toward the patients’ most vulnerable areas for skin breakdown without internal obstruction. – Isolibrium provides lateral rotation therapy up to 40 degrees to assist with early mobility protocols and help support the reduction of pulmonary complications. Stryker’s ProCuity ZMX bedframe integrates seamlessly with the leading pressure injury prevention surface – Isolibrium.

Intervention: The total study period (i.e., pre- and post-intervention) ranged from 01-Jan-2021 to 31-Aug-2022, with an intervention period of 01-Nov-2021 to 31-Aug-2022. During the study period, Bon Secours Southside Medical Center monitored the occurrence of pressure injuries in patients receiving treatment in the ICU/CVICU. Notably, the patient population was at high risk for chronic diseases such as obesity, renal failure, hypertension, and were in overall poor health. At the beginning of the intervention period, each of the 14 beds in the ICU (study group) were replaced with Stryker beds, while the 14 existing CVICU beds remained (control group). At the conclusion of the study period, data related to HAPIs was manually extracted and analyzed.

Other protocols were followed during the entire study period, all with the goal of decreasing pressure-related injuries. These included:

- Pressure injury preventative measures (i.e., heel boots, zinc cream/barrier cream, wedges, care plan) in particularly high-risk patients
- Staff was encouraged to continue the practice of q2 turning and repositioning, early assessment, early consults to wound care, and ensuring that preventative measures were in place.

These practices were followed during the entire study period, in both the study and control groups, including pre-intervention.

Collaboration: The initiative involved the collaboration of an interdisciplinary team, consisting of the following:

- Primary Registered Nurses (RNs), Patient Care Technicians (PCT)/Patient Care Assistant (PCA), Unit Secretary, Assistant Nurse Manager, Director
- 92 total associates; approximately 60% travelers on night shift; approximately 20% travelers on day shift
- Wound care and bedside nurses

Education: Hospital staff underwent training which was provided by the Acute Care Stryker Account Manager. Prior to Stryker Bed delivery, the Stryker Account Manager provided in-servicing on seven consecutive days to both day (7AM-7PM) and night (7PM-7AM) staff. When the beds were delivered, the Stryker Account Manager provided additional education over three days to supplement the initial training. In addition, during this time, the Stryker Account Manager worked with the Bon Secours team to identify a Stryker bed Superuser on staff for dayshift, nightshift, and the wound care team. The Superusers were responsible for continued staff education.

⁹ Stryker ProCuity® ZMX frames with Isolibrium®/Isolibrium PE surfaces

RESULTS

During the 10-month pre-intervention period, a total of 44 HAPIs occurred (36 ICU, 8 CVICU). During the intervention period, there was a 91.7% decrease in the number of ICU (Stryker beds) HAPIs ($n=3$, see Figure 1), while 20 occurred in the CVICU (non-Stryker beds).

Figure 2 summarizes the total number of HAPIs that occurred each month during the intervention period, separated by clinical setting. Compared to the CVICU, there were 12 times fewer HAPI occurrences in the ICU (see Figure 3).

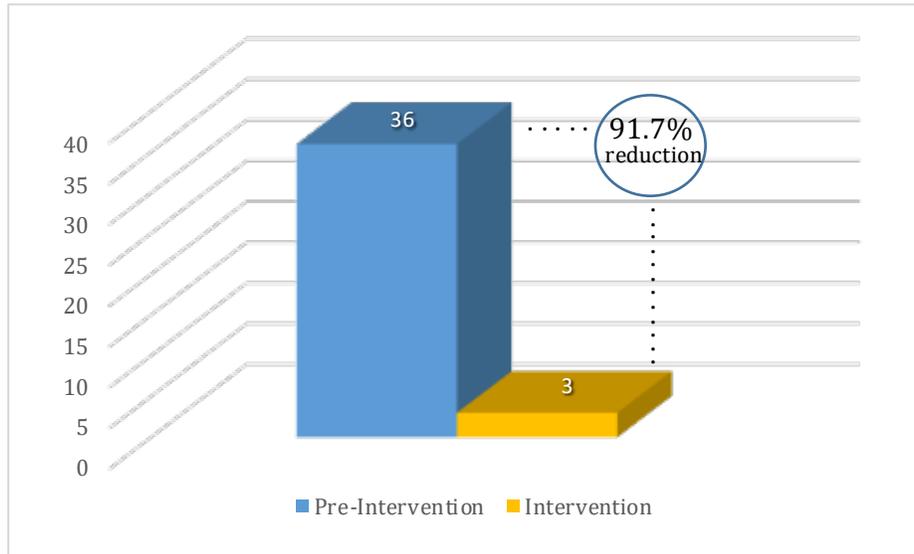


Figure 1. Total number of HAPIs reported in the ICU, pre-intervention versus intervention period

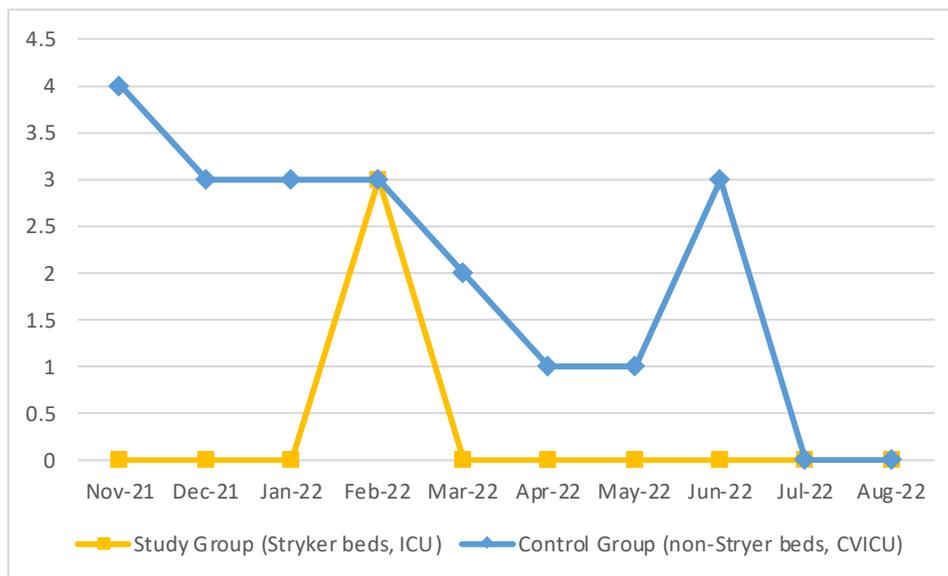


Figure 2. Number of HAPIs per month during intervention period, ICU (Stryker beds) versus CVICU (non-Stryker beds)

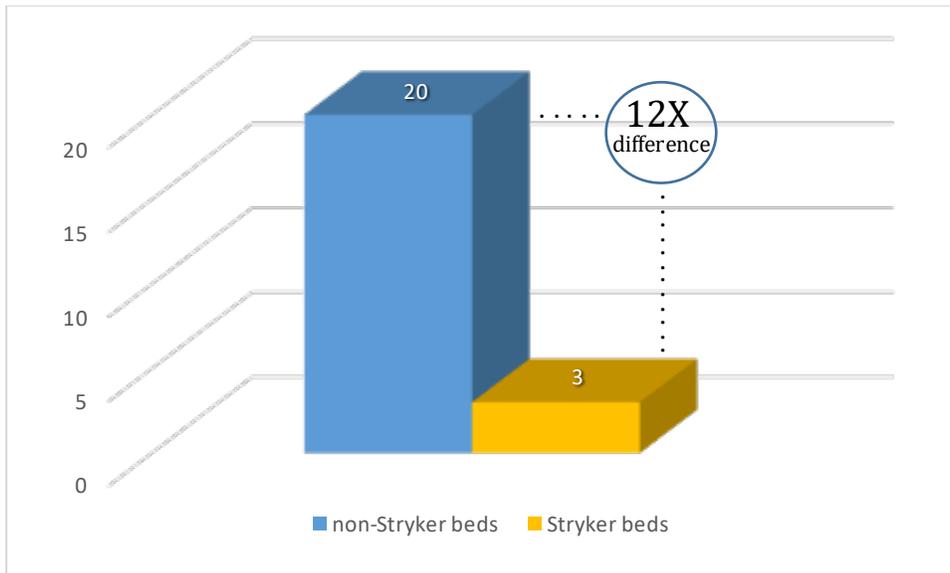


Figure 3. Total HAPIs during intervention period, Stryker versus non-Stryker beds

Notably, in the ICU, no HAPIs occurred during the final six (6) consecutive months of the intervention period. In addition, based on the national average HAPI cost, the 91.7% decrease in the total number of ICU HAPIs saved Bon Secours Southside Medical Center an estimated \$660,000-\$5,006,100.



Figure 4. Number of days in the ICU without HAPI occurrence



Figure 5. Estimated hospital cost savings due to decrease in HAPI occurrence based on United States national average cost.⁶

CLINICAL IMPLICATIONS

Preventive measures administered and conducted by hospital personnel can successfully limit the number of HAPIs only to a certain degree. When combined with these efforts, state-of-the-art patient bed technology can significantly decrease the HAPI occurrence, leading to enhanced patient care and decreased hospital cost.