Preventing Falls and Injury for Hospital Patients Using a SEIPS Framework

Section I:

Contributing Authors:

Submitted by:

Laurie Wolf, PhD, CPE, ASQ-CSSBB (ldwolf@carilionclinic.org) 1-540-655-3640

Harsh Sanghavi, M.S.: Human Factors Consultant

Amanda Anderson, MSN, RN, CHSE: Simulation Lab Education Facilitator

Kathryn Booth, MSN, RN, CCRN-K: Nursing Unit Director

Website: https://carilionclinic.org/human-factors#about-human-factors

Keywords: Inpatient Fall Prevention, HFE, SEIPS

Industry: Health Care and Patient Safety

Section II:

Aim: The goal of this study was to create a fall prevention program that would reduce risk of injury from falls with a particular focus on falls related to toileting. The scope of this long-term project was a commitment to a culture of teamwork to achieve a deep understanding of how fall prevention measures integrate into the daily workflow for all staff.

Role of the ergonomists/human factors expert: A human factors (HF) engineer partnered with a multidisciplinary team to develop a fall prevention program for patients on a cardiac, stepdown unit at a large academic medical center. Contributions of the HF engineer included facilitation of team meetings, collaboration to develop interventions customized to fall risk and conducting post fall investigations with staff and patients after every fall.

Main areas of intervention: A multifaceted approach to fall prevention program was implemented on one inpatient hospital unit. Several interventions were implemented over two years including changes in physical layout, organizational changes in the nursing care model, communication strategies, and innovative training techniques using simulation to encourage teamwork and promote critical thinking skills in patient care.

Background: Two years prior to implementing the interventions and simulation training, the nursing unit involved in this project had 63 patient falls (five of these falls resulted in serious injury). 77% of falls in one year occurred due to toileting needs or similar issues. There was a disconnect between fall risk factors and appropriate interventions to reduce the risk of a patient falling. While staff were aware of their individual roles and were working hard to keep patients from falling, there was a lack of awareness of how the staff needed to work together to reduce fall risk. For example, in the case of ensuring fall prevention during toileting, a nurse aide may offer a patient the opportunity to toilet every two hours and assume their task was complete. But a nurse would need to know whether the patient had voided in the previous six hours as an indication of clinical concern. The lack of shared awareness and differences in the culture of teamwork could result in staff looking for the wrong cues when checking in with a patient for toileting.

Section III:

Method: The SEIPS model provided the foundation for a systems approach to post fall investigations and intervention development (Carayon, et al., 2020). A Human Factors Engineer conducted a post fall investigation after every patient fall for two years. The results of these investigations along with team collaboration, drove the selection of interventions to prevent risk of fall.

A multidisciplinary team collaborated to implement several interventions including changes in environment, work tasks, teamwork, organizational components, tools, and technology. Interventions were modified as needed over time to make them successful for the front-line workers.

- Environmental changes:
    - Storing Bedside Commode in Bathroom: When the bedside commode was located next to the bed, several falls occurred as patients failed to call for help thinking they could get to the bedside commode on their own. By storing the commode out of sight, the purpose was to discourage patients from getting up alone.
    - Lift devices: Patient handling devices were introduced and included in fall prevention training at the Simulation Center.
    - Physical adaptions for Pod Nursing: Slight adaptions needed to be implemented in the hallways to support the Pod nursing strategy. For example, computer workstations on wheels and chairs needed to be strategically located to allow nurses to work near their patients' rooms to allow quick access to call light and bed alarms.
- Work task and Teamwork interventions:
    - Potty Board and Night Buddy System: A laminated paper in the patient room was available for quick glance that showed toileting activity to improve documentation/communication. A buddy system between nursing and nurse aides was implemented to sustain toileting activities during night shift coverage to increase the frequency and quality of toileting opportunities. (This feature was a supplement to existing hourly rounding practice.)
- Communication interventions:
    - Change of Shift Huddles: All staff gather in the hallway for daily safety huddles at the start of every shift to review plans and concerns that require staff awareness. Fall prevention was included in these discussions. Patients with high falls risk and interventions were reviewed along with fall trends (number of days since last fall).
- Organizational interventions:
    - Pod Nursing Model: A new model of assigning patients to nurses and nurse aides was implemented based on geographic location. Staff proximity to a patient's room improves response time to patient needs and bed alarms.
- Tools and Technology interventions:
    - Risk Assessment: Understanding a patient's risk for falling and injury is an important component in developing a customized fall prevention plan (Hignett and Wolf, 2016). Human Factors observations showed that nursing practices varied according to usage of the Morse Fall Scale. A notebook and training materials were distributed to all nurses and aides.
    - A machine learning tool was also implemented to further understand when a patient was at risk for a fall. This cutting-edge technique is still under investigation to fully incorporate the benefits into a fall prevention strategy.
    - Bed alarm technology: Training was conducted to ensure the existing bed alarm strategy was understood by all staff. Occasionally an alarm was determined to be "off" instead of "on pause". The "off" mode does not take advantage of the automatic reset feature when a patient returns to bed.

Simulation was an innovative addition to the educational component and allowed learners to get hands-on practice in a realistic setting. Scenario-based training was conducted in a Simulation Center to teach critical thinking skills and build teamwork as part of the fall prevention program. Training sessions were conducted in the hospital system's Center for Simulation, Research and Patient Safety (Sim Center) and were based on events discovered during the post fall investigations. All nurses and aides participated in the training sessions.

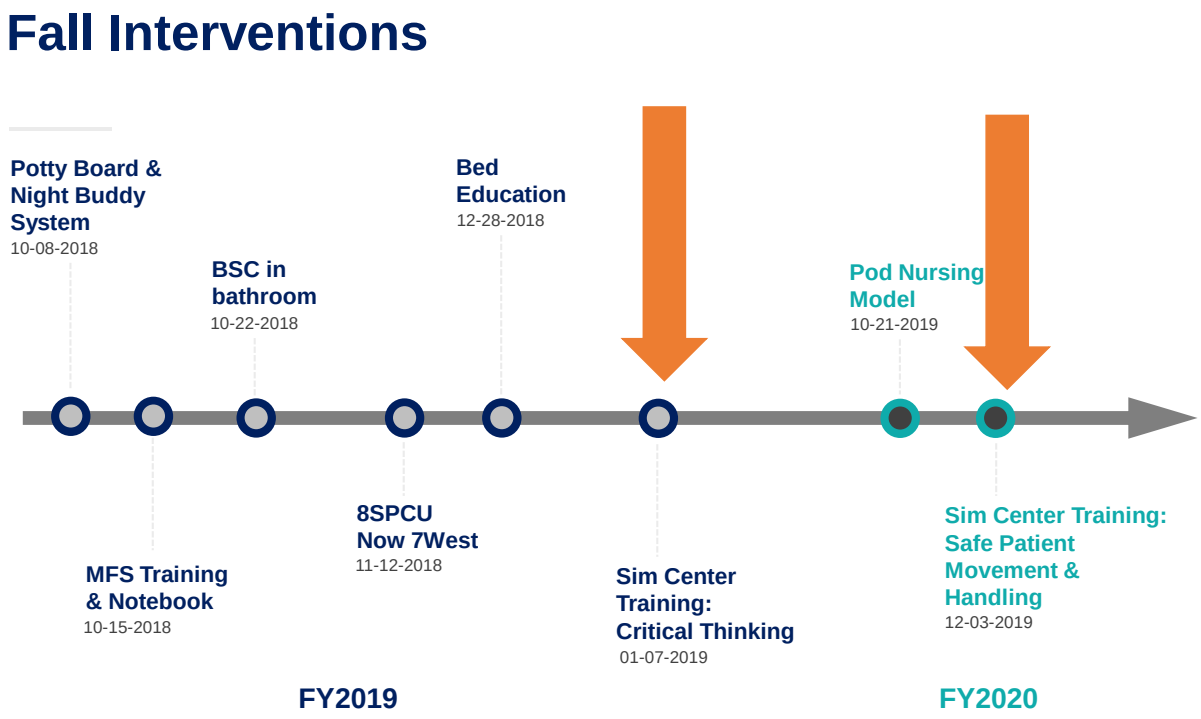

Figure 1: Fall Intervention Timeline

Results:

The changes in work tasks, adoption of the pod nursing model and simulation training helped to achieve a strategic culture change that improved critical thinking skills focused on patient fall prevention. Fall rates and trends were tracked for two years before interventions began and compared with the two years during and after interventions were completed.

The combination of multifaceted interventions helped reduce total fall rate from 3.97 before intervention to 3.07 as well showing a reduction in falls with serious injury rate from 0.36 to zero (rate = falls per patient days x 1,000). The nursing unit also achieved an unprecedented 95-day fall-free streak and two fiscal years with no falls with injury.

According to literature, the cost of a fall with serious injury is reported to be $13,316 along with an average of 6-12 additional days of hospital stay (Wong, et al., 2011). Using this premise, since five falls with serious injury occurred during the two years before interventions and zero occurred in the two years afterward, a cost avoidance of at least $66,580.00 could be surmised.

Conclusion:

The use of fall interventions implemented in-situ and supplemented with Sim Center training can be an effective way to reduce patient falls and foster a culture that encourages critical thinking, inter-disciplinary culture and collaboration, and shared awareness among team members.

References:

Carayon, P., Wooldridge, A., Hoonakker, P., Hundt, A. S., & Kelly, M. M. (2020). SEIPS 3.0: Human-centered design of the patient journey for patient safety. Applied ergonomics, 84, 103033.

Hignett, S., & Wolf, L. (2016). Reducing inpatient falls: Human factors& ergonomics offers a novel solution by designing safety from the patients' perspective. International Journal of Nursing Studies, 59, A1-A3. doi:10.1016/j.ijnurstu.2016.02.007 N.A.

Wong CA, Recktenwald AJ, Jones ML, Waterman BM, Bollini ML, Dunagan WC. The cost of serious fall-related injuries at three Midwestern hospitals. Jt Comm J Qual Patient Saf. 2011;37(2):81-87. doi:10.1016/s1553-7250(11)37010-9

Please email your summary to:

Michelle Roberston mmrobertson321@gmail.com; Susan Hallbeck hallbeckhfes@gmail.com