Shirley Ryan Abilitylab

Mentorship Grant Application

Pressure Injury Prevention Through Validation and Application of Risk Assessment Scores

Primary Mentored Clinical Investigator (Allied Health): Bridget Fowler King PT, DPT, NCS - Master Physical Therapist, 20th floor Nerve Muscle Bone Innovation center, 19th Floor Rafferty KTEAM Lab

Manager Contact information: Martha Smith PT, DPT msmith@sralab.org (split 50/50 with Miriam Rafferty)

Other investigator team members (Nursing):

Jennifer Bifro MSN, RN, CNL – Co-Investigator (Nursing) - coordinator, patient safety and accreditation

Manager: Dana Nelson dnelson@sralab.org

Interdisciplinary Team Consultants

Colleen Johnson PT, DPT – Allied Health Skincare Champion Lead

Isabelle Brew, BSN, RN, CWOCN – Wound Care Nurse

Research Mentors:

Allen Heinemann, PhD – Director, Center for Rehabilitation Outcomes Research

Miriam Rafferty PT, DPT, PhD, NCS - 19th floor Strength + Endurance Lab

Request for Mentorship Grant: $25,000

Shirley Ryan Abilitylab

Introduction and Background

Since 2008, Centers for Medicare Services (CMS) has stopped covering costs for hospital-acquired pressure injuries (HAPIs).[1] CMS deemed HAPIs events that should never occur, but nearly 2.5 million HAPIs develop per year in the United States, costing an estimated 26.8 billion dollars.[2-4] HAPIs could cost a hospital anywhere from $500-$70,000 per individual pressure ulcer.[4,5]

There has been extensive development of recommendations and clinical practice guidelines (CPGs) from the National Pressure Injury Advisory Panel (NPIAP) and the Agency for Healthcare Research and Quality (AHRQ) to address HAPIs.[2,3,5] However, they are hard to implement and generalize across different clinical settings.[6,7] CPGs in HAPI prevention recommend standardized risk assessment of pressure injuries (PIs) such as the Braden Scale for Preventing Pressure Sore Risk© assessment tool (Braden).[3,5,8] The Braden is a widely used and accepted gold standard for HAPIs assessment in acute care and long-term care facilities; however, the clinical use and validity in the inpatient rehabilitation setting is limited across all populations.[2,9-13] At Shirley Ryan AbilityLab (SRAlab), we currently complete the Braden on all patients on admission, and daily if a patient scores 14 or less out of 23 (moderate risk 13-14, below 13 high and very high risk).[14]

There are several key problems with the Braden for inpatient rehabilitation use. First, the Braden does not capture key variables for that may place our patients at risk for HAPI, such as pain, diabetes, mood, albumen levels, and history of PIs.[12,14-17] Second, scoring guidelines suggest risk cutoff scores of 15 and below in the spinal cord injury (SCI) population, but guidelines are not established in other populations.[12-15,17] Third, our patients are now experiencing HAPIs at a much higher rate than other rehabilitation hospitals. According to the Exchanged Quality Data for Rehabilitation (EQUADR) our most recent HAPI rate is 4.3% per patients discharged, compared to a national rate of 1.3% across participating inpatient rehabilitation facilities. Between June-December 2020, SRAlab has had 71 patients over the age of 18 with HAPIs. Nursing pilot data suggests that 44% of those patients develop HAPI despite being categorized as mild risk (Braden score of 15-18 on admission). Fourth, AHRQ recommends that interdisciplinary teams are critical to address prevent and reduce HAPIs, but at SRAlab allied health professionals have not been trained on how to interpret or use the Braden.[2]

The goal of this proposal is to reduce HAPIs at SRAlab through improved validation and application of the Braden across disciplines. In the last year, nursing explored the relationship between Braden scores and future development of HAPI, leading to some of the concerns stated above about the appropriateness of the cutoff score. Also in the last year, my preparatory work included a needs assessment using survey and focus group data that identified possible improvement activities of implementing wound-rounds hospital-wide instead of just on the spinal cord injury unit, simplifying interdisciplinary documentation and communication on PIs, and educating therapy staff on HAPI prevention approaches.[18] From this work, allied health (AH) skincare champions developed a pressure mapping decision tool using the Braden cut off scores established based on their experience in spinal cord injury populations. The proposed research aligns nursing and AH efforts.

Aim 1. Validate the Braden Scale for Preventing Pressure Sore Risk© as a risk assessment tool to improve PI prevention in inpatient rehabilitation. We will use retrospective data on Braden scores, other patient characteristics, and HAPI incidence. H1a. We hypothesize that subscale items of Braden will be more predictive than the overall score. H1b. We hypothesize that the predictive validity of the Braden will improve when combined with other risk factors (e.g. diabetes, pain, depression, albumen levels, past history of PI). H1c. We hypothesize that the risk cut off scores will vary across different patient populations.

Aim 2: Study the effects of two organizationally planned interventions on HAPI incidence. The organization will be beginning two new initiatives in the next 6 months. 1) AH pressure mapping decision tool with Braden cut off score of less than or equal to 14 to reduce HAPI sacral/ischial pressure injury incidence and 2) Training on Braden application for nursing staff and in interdisciplinary wound rounds. We will conduct formal data collections to assess these interventions. H2: We hypothesize HAPIs for sacral/ischial pressure injury will decrease over time after HAPIs implementation of the two interventions.

Significance and Implications

The potential for this proposal to reduce SRAlab HAPIs addresses a significant organizational need while contributing to the literature to validate and improve application of HAPI prevention CPGs in inpatient rehabilitation. This clinical translation research project combines input from research experts in measurement validation and CPG implementation with clinical interdisciplinary experts. I am seeking mentoring to become more independent with research, and the nursing team member is looking to gain knowledge of basic research methods. Bringing this team together has implications to improve SRAlab processes and will be impactful to the wider impatient rehabilitation community as we work towards solving a complex problem.

Methods:

The proposed project utilizes measurement validation design and observational cohort methodology using retrospective and prospective and non-probabilistic sampling methods. We will request admission and repeat Braden Scale data from Cerner and presence of HAPI from eRehab or appropriate data sets for all patients beginning 7 months before the study period (June 2020) for 18 months (Dec 2021). We will merge these datasets. Then we will observe the implementation of the two proposed interventions. The AH pressure mapping decision tool is planned to be implemented in March 2021. The wound rounds plan is for implementation on all floors with goal of June 2021. We will provide implementation facilitation as needed to the primary clinical leads of these initiatives, Colleen Johnson PT, DPT and Isabelle Brew, BSN, RN, CWOCN.

Aim 1: Using the retrospective data from June 2020-Dec 2020, we will explore the predictive validity of the Braden scores to identify the 71 HAPIs noted in our pilot analysis. We will work with the Biostatistics Collaboration Center statisticians (BCC) to complete these analyses. We anticipate using Rasch models and the classical theory for reliability and criteria validity.[19-22] Additionally, we anticipate using logistic regression models to determine associations and relationships of Braden subscale variables and other patient characteristics that may influence risk of HAPI (e.g. age, diabetes, pain, depression, albumen levels, and history of PI prior).[13,23,24] Analyses will also be conducted to evaluate content validity and construct validity for cohorts of the three innovation centers (Brain, Spinal Cord, and Nerve Muscle Bone).

Aim 2: We have developed implementation and intervention fidelity checklists for the two interventions. These checklists include domains of Adherence, Dosage, Quality of Intervention Delivery, Participant Responsiveness and Program Differentiation.[25,26] The checklists will be performed through manual chart audit/EMR data collection, entered into REDCap to assess interventions for AH staff for the pressure mapping decision tool and nursing staff regarding nursing and Braden use in wound rounds. For example, adherence will be measured for AH, if a patients Braden score was less than or equal to 14 (or appropriate validated cut off score) the patient should be pressure mapped. Cohort wound rates will be compared retrospectively and prospectively using narrative analyses or statistics if deemed appropriate by BCC. Logistic regression models will be considered. We will track when these implementation efforts start in comparison to the data.

Outcomes measured:

1. Rate of HAPIs will be tracked over time pre and post Braden validation and implementation of Aim 2.
2. Adherence rate of pressure mapping will be followed pre and post implementation of Aim 2.
3. HAPIs that were healed during patient's stay will be tracked pre and post implementation of Aim 2.
4. We will track high risk patients added to wound rounds through use of Braden in wound rounds
5. Audit use of EMR chart communication and staff communication console use between nursing and AH.

Project Timeline:

Months	0-3	3-6	6-9	9-12	12-18
IRB submission and approval	■				
Aim 1 Redcap/ EMR data entry	■	■			
Statistical Analysis of Braden subscales & other variables with statistician/BCC	■	■			
Education to AH/Nursing Staff on Braden use for wound rounds/Pressure mapping decision tool		■			
Aim 2 Fidelity checklist for Nursing Braden use		■	■	■	
Aim 2 Fidelity checklist for AH pressure mapping decision tool		■	■	■	
Poster/platform preparation			■	■	■
Manuscript preparation				■	■

Deliverables:

1. Poster/platform presentations for American Congress of Rehabilitation Medicine conference and the Association of Rehabilitation Nurses conference
2. Two manuscripts: (1) Braden measurement validation (2) effectiveness of novel Braden application interventions (Allied health pressure mapping tool, Braden use in wound rounds).
3. Prep for larger grant potentially to perform at a larger scale and to incorporate quantitative/qualitative mixed methods and broadening reach to day rehab/outpatient, and our affiliated sites.

Shirley Ryan Abilitylab

References:

1. Eliminating Serious, Preventable, and Costly Medical Errors-Never Events. *Fraud Waste and Abuse* 2006; https://www.cms.gov/newsroom/fact-sheets/eliminating-serious-preventable-and-costly-medical-errors-never-events#:~:text=ELIMINATING%20SERIOUS%2C%20PREVENTABLE%2C%20AND%20COSTLY%20MEDICAL%20ERRORS%20%2D%20NEVER%20EVENTS,-May%2018%2C%202006&text=OVERVIEW%3A&text=%E2%80%9CNever%20events%2C%E2%80%9D%20like%20surgery,the%20consequences%20of%20the%20error. . Accessed February 5, 2021.
2. Preventing Pressure Ulcers in Hospitals 2014; https://www.ahrq.gov/patient-safety/settings/hospital/resource/pressureulcer/tool/index.html. Accessed January 20, 2021.
3. Pressure Injury Prevention in Hospitals Training Program{Edsberg, 2014 #180}. 2017; https://www.ahrq.gov/patient-safety/settings/hospital/resource/pressure-injury/index.html. Accessed January 5, 2020, 2020.
4. Padula WV, Delarmente BA. The national cost of hospital-acquired pressure injuries in the United States. *International wound journal.* 2019;16(3):634-640.
5. Haesler E. *National Pressure Ulcer Advisory Panel, European Pressure Ulcer Advisory Panel and Pan Pacific Pressure Injury.* Osborne Park, Western Australia: Cambridge Media; 2014.
6. Chaudoir SR, Dugan AG, Barr CH. Measuring factors affecting implementation of health innovations: a systematic review of structural, organizational, provider, patient, and innovation level measures. *Implement Sci.* Feb 17 2013;8:22.
7. Morris ZS, Wooding S, Grant J. The answer is 17 years, what is the question: understanding time lags in translational research. *Journal of the Royal Society of Medicine.* Dec 2011;104(12):510-520.
8. *Pressure Ulcer Prevention and Treatment Following Spinal Cord Injury: A Clinical Practice Guideline for Health-Care Professionals.* Second ed: Paralized Veterans of America; 2014.
9. Källman U, Lindgren M. Predictive validity of 4 risk assessment scales for prediction of pressure ulcer development in a hospital setting. *Advances in skin & wound care.* Feb 2014;27(2):70-76.
10. Pancorbo-Hidalgo PL, Garcia-Fernandez FP, Lopez-Medina IM, Alvarez-Nieto C. Risk assessment scales for pressure ulcer prevention: a systematic review. *Journal of advanced nursing.* Apr 2006;54(1):94-110.
11. Wei M, Wu L, Chen Y, Fu Q, Chen W, Yang D. Predictive Validity of the Braden Scale for Pressure Ulcer Risk in Critical Care: A Meta-Analysis. *Nursing in critical care.* May 2020;25(3):165-170.
12. Bergstrom N, Braden B, Kemp M, Champagne M, Ruby E. Predicting Pressure Ulcer Risk: A Multisite Study of the Predictive Validity of the Braden Scale. *Nursing research.* 1998;47(5):261-269.
13. Flett HM, Delparte JJ, Scovil CY, Higgins J, Laramée MT, Burns AS. Determining Pressure Injury Risk on Admission to Inpatient Spinal Cord Injury Rehabilitation: A Comparison of the FIM, Spinal Cord Injury Pressure Ulcer Scale, and Braden Scale. *Arch Phys Med Rehabil.* Oct 2019;100(10):1881-1887.
14. Bergstrom N, Braden B, Kemp M, Champagne M, Ruby E. Multi-site study of incidence of pressure ulcers and the relationship between risk level, demographic characteristics, diagnoses, and prescription of preventive interventions. *Journal of the American Geriatrics Society.* Jan 1996;44(1):22-30.
15. Bergstrom N, Braden BJ, Laguzza A, Holman V. The Braden Scale for Predicting Pressure Sore Risk. *Nursing research.* Jul-Aug 1987;36(4):205-210.
16. Bergstrom N, Demuth PJ, Braden BJ. A clinical trial of the Braden Scale for Predicting Pressure Sore Risk. *The Nursing clinics of North America.* Jun 1987;22(2):417-428.
17. Braden BJ. The Braden Scale for Predicting Pressure Sore Risk: Reflections after 25 Years. *Advances in skin & wound care.* 2012;25(2).
18. King BF. Using the Knowledge to Action Framework in Clinical Practice: Therapist Beliefs, Knowledge and Self-Efficacy for the Prevention of Pressure Injuries at a Rehabilitation Hospital. *Archives of Physical Medicine and Rehabilitation.* 2020;101(12):e154.
19. Linacre J. Sample Size and Item Calibration Stability. *Rasch Measurement Transactions.* 01/01 1994;7:328.
20. Rasch G. On general laws and the meaning of measurement in psychology. Paper presented at: Proceedings of the fourth Berkeley symposium on mathematical statistics and probability1961.
21. Messick S. Validity of psychological assessment: Validation of inferences from persons' responses and performances as scientific inquiry into score meaning. *American psychologist.* 1995;50(9):741.

22. Obuchowski NA. Sample size calculations in studies of test accuracy. *Statistical methods in medical research.* Dec 1998;7(4):371-392.

23. Diaz ZM. *Validity of the Braden Scale® to predict the risk of developing pressure ulcers in a hospital population in Bucaramanga - Colombia* 2015.

24. Díaz ZR, Parra DI, Camargo-Figuera FA. Validity and Quality indices of Braden and Norton scales. *Gerokomos.* 2017;28(4):200-204.

25. An M, Dusing SC, Harbourne RT, Sheridan SM, Consortium S-P. What Really Works in Intervention? Using Fidelity Measures to Support Optimal Outcomes. *Physical Therapy.* 2020;100(5):757-765.

26. Carroll C, Patterson M, Wood S, Booth A, Rick J, Balain S. A conceptual framework for implementation fidelity. *Implementation Science.* 2007/11/30 2007;2(1):40.