PATIENT CHARACTERISTICS ASSOCIATED WITH EFFECTIVE FALL PREVENTION UTILIZING TELEMONITORING

A Scholarly Project Submitted in Partial Fulfillment of

The Requirements for the Degree of

Master of Science in Nursing

in

The Onanian School of Nursing

Rhode Island College

May 14, 2022

by

Kathleen A. Fournier

MSN Scholarly Project Team

_____

MSN Scholarly Project Advisor

_____

MSN Scholarly Project Content Expert

_____

MSN Scholarly Project Organizational Mentor

_____

MSN Program Director

PATIENT CHARACTERISTICS ASSOCIATED WITH EFFECTIVE FALL PREVENTION UTILIZING TELEMONITORING

A Scholarly Project Submitted in Partial Fulfillment of

The Requirements for the Degree of

Master of Science in Nursing

in

The Onanian School of Nursing

Rhode Island College

May 14, 2022

by

Kathleen A. Fournier

Acknowledgments

I would like to acknowledge my first reader, Dr. Linda Dame, for her unwavering and consistent support throughout this project. I'd also like to acknowledge the support of my husband, Collin and daughter, Grace, who have supported my efforts and tolerated my divided time and attention to allow for the completion of this project over the past year.

Abstract

Fall prevention is a universal issue addressed daily by healthcare teams working in acute care hospitals. One method of fall prevention is through the use of remote video surveillance (telemonitoring). The characteristics that are associated with patients that are the most appropriate candidates for video surveillance to reduce fall rates have not been determined due to the use of telemonitoring being new and its sudden increase in use. A retrospective record review was conducted to identify patients that would potentially benefit from telemonitoring**.** Results supported patients that would benefit most were oriented to person and place, or person, place, time, and situation. This may verify the inference that a higher level of orientation correlates with successful telemonitoring. The age range of the included records was not revealing as the ages were evenly distributed in the included sample. This project reinforces the effectiveness of telemonitoring for patients at high risk of falls as 24 out of 25 patients were scored as a high risk for fall based on their fall risk assessment score. Implications for advanced nursing practice include the use of novel technologies such as telemonitoring to maintain patient safety while using resources in a cost effective and efficient way.

Key Words: falls; fall prevention; telemonitoring; video monitoring; observation; fall risk assessment; and sitters; acute care hospita

Table of Contents

FALL PREVENTION UTILIZING TELEMONITORING: PATIENT CHARACTERISTICS ASSOCIATED WITH EFFECTIVE FALL PREVENTION

Background/Statement of the Problem

Fall prevention is a universal issue addressed daily by healthcare teams working in acute care hospitals. Falls are defined as a "sudden, unintentional descent, with or without injury to the patient, which results in the patient coming to rest on the floor or on some other surface, on another person, or on an object" (Daley et al., 2020, p. 57). Hospitalized patients are at an increased risk of falls resulting from a combination of factors. Some of these factors include a history of falls, advanced age, altered mental status, the unfamiliar environment of the acute care setting, polypharmacy, and/or a patient's potential inability to recognize their physical limitations (Rohm et al., 2020). Preventing patient harm through falls is a priority to reduce physical and emotional harm to patients, and also to reduce the additional costs associated with injuries from a patient fall to both the patient and the facility providing patient care (Rohm et al., 2020). One method of fall prevention is through the use of remote video surveillance. This is an alternative to patient sitters and has been shown through current evidence that it is an effective method to decrease fall rates. It is at a minimum, equally as effective at preventing falls as is assigning a traditional patient safety attendant or sitter to a patient at an increased risk of falls (Ndoda et al., 2019). Video surveillance, or telemonitoring, utilizes staffing and financial resources more efficiently (Ndoda et al., 2019). One staff person is able to monitor multiple patients remotely through a camera in the patient's room, and alert staff of any concerning behavior that may be indicative of an impending fall. The camera is equipped with a microphone that allows for communication of

reminders to the patient to maintain their safety until the in-person staff arrive in the room. Patient privacy needs to be considered and privacy laws and policies must be adhered to with video monitoring.

The characteristics that are associated with patients that are the most appropriate candidates for video surveillance to reduce fall rates has not been determined due to the use of telemonitoring being new and its sudden increase in use. A retrospective record review was conducted to identify patient characteristics that are associated with successfully preventing falls using telemonitoring. The information derived from this record review can serve as a starting point to identify what patient characteristics indicate telemonitoring is the most appropriate intervention.

Literature Review

A literature review was performed from 2007 to 2020 and included peer reviewed journals and articles written in the English language Search terms utilized were falls, fall prevention, acute care hospital, telemonitoring, video monitoring, observation, fall risk assessment, and sitters. Databases utilized included CINAHL Plus and OVID.

Falls in the Acute Care Setting

The Joint Commission (2015) issued a sentinel event alert outlining the widespread and detrimental nature of falls in healthcare facilities. In the United States, hundreds of thousands of falls occur annually in the hospital setting. Thirty to fifty percent of these falls cause injury. Injury from a fall will likely cause a delay in discharge and an increased cost of patient care, averaging $14,000 (Joint Commission, 2015). Characteristics that can increase the risk for a fall are assessed through standardized tools, as recommended by the Joint Commission (2015). Patient characteristics that increase risk for falls in the inpatient setting include advanced age (ages 60 and older), history positive for recent falls, incontinence, impaired mobility, impaired cognition, and taking certain medications (patient controlled analgesia, opiates, anticonvulsants, antihypertensives, diuretics, hypnotics, laxatives, sedatives, and psychotropics) (Poe et. al, 2018). The presence of these characteristics indicates a need for the implementation of fall prevention methods.

Fall Prevention

There is a vast body of literature on falls and fall prevention (Joint Commission, 2015). Many interventions, recommendations, and methods for preventing falls have been utilized but falls continue to occur despite these efforts (Joint Commission, 2015).

Rohm et al. (2020) studied fall reduction in the acute care setting. The purpose of the investigation was to decrease the occurrence of falls by 15% and to increase patient satisfaction scores by 5%. The fall rate at a 532-bed tertiary hospital in Ohio was above the national average prior to the implementation of the study interventions. A mini-root cause analysis was performed to determine why falls continued to occur in a neuroscience and oncology unit. After completing multiple mini root cause analyses, it was determined that staff needed education to identify patients who were at risk for falls and improve the methods of communication that indicated patients were at risk for falls. Interventions to increase communication were improved. A white board was placed in patient rooms to communicate fall risk, patient, and nursing responsibilities to prevent falls, and assistive devices required to prevent falls. This was a larger and more visible communication tool than the small sign (8.5 by 11 inches). The sign was increased to 11 by17 inch sign with larger font than previously used. The mini-root cause analyses were used in real time after falls to educate staff and encourage a "culture of learning" (Rohm et al., 2020). A statistically significant decrease in fall rate was reported on the neuroscience unit after initiating the above interventions; there were no falls with injury for 11 of 13 months. The oncology unit saw a decrease in its average number of falls, but no statistically significant decrease in the fall rate or fall rate with injury.

A retrospective review of the implementation of multiple fall prevention interventions was conducted to illustrate their utilization in fall reduction and maintaining decreased fall rates. Leone and Adams (2015) compared quarterly fall rates with the dates of implementation of fall prevention interventions. Interventions included safety huddles, bathroom signage, and hourly rounding. The most significant decrease in falls coincided

with successful implementation of hourly rounding. Leone and Adams (2015) reports despite multiple interventions to prevent falls and a culture of safety, fall rates fluctuated with no significant decrease.

Fall Risk Assessment

Identifying patients at risk of falling is an important starting point to prevent falls in those that are at high risk. The Johns Hopkins Fall Risk Assessment Tool (JHFRAT) is a widely used tool that serves as a standardized assessment to identify patients at risk of falls (Poe et al., 2018). The tool identifies several risk factors and assigns them a point value based on patient characteristics and history (Appendix A). The factors measured in this tool are advanced age (ages 60 and older), history of a recent fall, incontinence, impaired mobility, impaired cognition, and certain medications (patient controlled analgesia, opiates, anticonvulsants, antihypertensives, diuretics, hypnotics, laxatives, sedatives, and psychotropics) (Poe et. al., 2018). The points are added to indicate a low (less than 6 points), moderate (6 to 13 points), or high risk (greater than 13 points) of falling (Poe et al., 2018). A higher point value indicates a greater risk of a fall occurring (Poe et al., 2018).

A study by Poe et al. (2018) was conducted with the purpose of determining the validity and reliability of the JHFRAT. A large academic medical center was the choice for this investigation. A total of twenty thousand JHFRAT assessments were included in the reliability study (reproducibility of results) and the construct validity study (extent to which the tool predicts a fall) from eighteen in-patient units. The construct validity study was performed by comparing the JHFRAT to an existing assessment tool, the Morse Fall Scale (MFS). The MFS assesses six fall risk characteristics: a history of falls, secondary

disease, intravenous therapy, ambulatory aid, gait, and mental status (Cho et al., 2018). The MFS score ranges from 0 to 125, a score above 45 indicates a high fall risk (Cho et al., 2018). A comparative analysis of the MFS was performed simultaneously with the JHFRAT on the included units to assess validity. The reliability of the JHFRAT was assessed through a retrospective record review comparing JHFRAT scores with actual patient falls. The JHFRAT was identified as a valid and reliable tool for assessing fall risk in acute care patients. The JHFRAT can reliably assess patients at risk for falls and predict potential falls (Poe et. al, 2018).

In a tertiary teaching hospital, Cho et al. (2018) compared three fall risk assessment tools to identify which tool provided the greatest predictive validity of falls (Cho et al. 2020). The tools compared included the JHFRAT, the MFS, and the Hendrich II Fall-Risk Model (HFRM). The HFRM assesses patient characteristics that lead to increased fall risk including sex, elimination, mental status (including confusion, dizziness, symptomatic depression), medications (specifically antiepileptics and benzodiazepines), and the patient's ability to pass a "get up and go" test (Cho et al., 2018). The more characteristics present on the HRFM the more points are assigned. A score higher than 5 on the HFRM indicates a high risk of falling (Cho et al., 2018). A retrospective review of patient fall risk factors associated with each tool was compared to identify a negative or positive predictive value in addition to sensitivity and specificity. The JHFRAT was identified as the most accurate tool, while the HFRM provided the most accurate predictive assessment (Cho et al., 2020).

Patient Sitters to Reduce Falls

The use of a patient sitter has been reviewed for preventing patient falls. This method is alternatively referred to as a patient attendant or patient companion. A literature review by Lang (2014) was performed to explore if patient sitters reduced falls. Twelve articles (articles were non-experimental, correlational descriptive studies, or quality improvement projects), published between 1995 and 2013, were included in the review. A patient sitter is defined as a one-to-one observer to prevent falls in high fall risk patients (Lang, 2014). Two of the twelve studies concluded that adding sitters effectively reduced fall rates, the remaining ten studies did not provide conclusive evidence that sitters were an effective fall prevention method (Lang, 2014). A limitation of the studies reviewed by Lang (2014) was a lack of randomized controlled studies and scientific rigor in the area of fall prevention and the use of patient sitters. The studies in this review were classified as evidence Levels IV and V.

Vancil et al. (2020) conducted a quality improvement project to improve the use of one-to-one patient sitters utilized to prevent falls in a 200-bed hospital near St. Louis, Missouri. The aim of the project was to reduce the number of hours the sitters were used and decrease the costs associated with staffing one to one sitters without increased fall rates. A newly defined role for the patient sitter, re-named care companion, was outlined to include items such as the companion performing all activities of daily living, vital signs, and documentation instead of only observing from a distance. Other methods used included a checklist that assessed patient behavior warranting a care companion, a patient attendant assessment tool (to determine the need for a care companion), and a cognitive checklist to identify potential medical causes resulting in a state requiring a care

companion. The implementation of these methods while utilizing one to one sitters, or care companions, resulted in a 13% decrease in the use of patient sitters and a cost savings of $34,000 dollars over six months (Vancil et al., 2020).

Greeley et al. (2020) investigated the use of patient sitters, including video monitoring, and their effect on fall prevention through a systematic review of literature. The review included twenty studies. Each study was required to include the use of patient sitters for fall prevention. The outcome measurement was reported falls (Greeley et al., 2020). Eleven studies were time series studies, eight pre-post studies and one a quasi-experimental design. Eight studies found that sitters and/or the addition of telemonitoring either reduced or did not increase falls. A limitation of this systematic review was that the quality of evidence in the literature was low in quality and quantity (Greely et al., 2020). None of the studies used sitters as the only intervention for fall prevention. Examples of other alternatives to sitters included using video monitoring or nursing assessment and decision tools. The authors concluded that there was inadequate evidence to discourage the use of sitters at this time (Greeley et al., 2020).

Telemonitoring to Prevent Falls

Spano-Szekely et al. (2019) studied the effectiveness of telemonitoring, a mobility assessment, and hourly rounding on impulsive patients. The facility's fall prevention program required improvement as evidenced by an increased fall rate. The quality improvement project aimed to identify if individualized, evidence-based fall prevention interventions, in combination with assessment of patient fall risk, reduces falls. Staff education and the addition of video monitoring were implemented in an effort to reduce the fall rate. The interventions resulted in a fall rate reduction from 3.21 falls per one

thousand patient days to 1.14 falls per one thousand patient days (Spano-Szekely et al., 2019). Telemonitoring usage reduced the number of patient sitters required by 72%, which also equates to an $84,000 annual cost savings in sitter usage (Spano-Szekely et al., 2019).

A quality improvement project was performed by Purvis et al. (2018) utilizing video monitoring to improve safety outcomes (fall prevention) and reduce the cost of maintaining patient safety through the use of video monitoring on eight acute care inpatient units. Staff, patients, and families were educated on the use of video monitoring to prevent adverse outcomes in patients at risk for falls, self-harm, elopement, and confusion (Purvis et al., 2018). An algorithm was created to identify patients for constant observation utilizing telemonitoring. The algorithm excluded patients who did not respond to re-direction, repeatedly required 3 or more in person interventions despite video monitoring in thirty minutes, were on suicide precautions, locked restraints, or required violent restraints (Purvis et al., 2018). The implementation of telemonitoring resulted in a 6.76% decline in patient sitter full time equivalent hours, or an annual savings of $210,912 dollars with no increase in patient falls (Purvis et al., 2018).

The patient sitter is an intervention that has not shown a decrease in fall rates and is an expensive fall prevention method at $25,200 per year according to Votruba et al. (2016). The authors conducted a study to identify if telemonitoring would reduce fall rates while also reducing sitter usage for fall prevention. Telemonitoring was implemented in three inpatient units in a 350-bed hospital. Staff was trained to use the new intervention. A nine-month baseline fall rate was used to compare to the fall rate for nine months after the implementation of telemonitoring. A 35% decrease in the number

of falls resulted, (85 to 53 falls, $p<0.0001$), while also decreasing patient sitter usage. (Votruba et al., 2016). Votruba et al. (2016) concluded that telemonitoring was an effective intervention for fall prevention and more effective than patient companions.

Daley et al. (2020) investigated staffing patterns in conjunction with telemonitoring on two inpatient units at a large, mid-Atlantic medical center. The purpose of this investigation was to identify the most effective staffing pattern to employ in addition to the use of telemonitoring. Patients on telemonitoring were randomly assigned telemonitoring with or without a dedicated staff person rounding regularly on included units. The results of this randomized controlled study found that of 1032 patients over a 3-month time period, 2 falls occurred in the group with a dedicated rounder and 6 falls occurred without a dedicated rounder. The decreased falls in the group with the dedicated rounder were not statistically significant. The study concluded that the dedicated rounder for telemonitored patients was not necessary (Daley et al., 2020).

Telemonitoring with two-way communication (patient engaged video surveillance or PEVS) was implemented at seventy-one hospitals utilizing the Ava-Sys monitoring device (Quigley et al., 2019). A single technician remotely monitors a maximum of sixteen patients via the monitoring system from a remote location (Quigley et al., 2019). A descriptive base study was conducted through an analysis of data from the Ava-Sys data reporting system from July 2017 to May 2018 including a total of 15,021 patients. Patients at high risk for adverse outcomes (falls, pulling at lines, tubes or drains, elopement) due to altered mental status, acuity, agitation, or impaired mobility were candidates for PEVS (Quigley et al., 2019). The telemonitoring system allowed for verbal communication, interaction, and re-direction through the telemonitoring camera and

activation of an alarm to alert unit staff of a need for in-person assistance (Quigley et al., 2019). Quigley et al. (2019) reported an average of 20.5 verbal interactions in patients being telemonitored who experienced a fall. Patients who did not experience a fall while telemonitored totaled 15.7 verbal interactions per patient per day (p=.0005). There were less verbal interactions in the patients who did not fall while telemonitored. Telemonitoring provides a capability for rapid verbal intervention in an unsafe circumstance (i.e. a patient is attempting to get out of bed unassisted) and the timeliness of response may be related to decreased fall rates in the telemonitored population (Quigley et al., 2019).

Telemonitoring has been found to be an effective intervention to prevent falls in the inpatient acute care setting. Cost savings also results with of the use of telemonitoring with the reduction in the use of patient sitters. There is a scarcity of current literature pertaining to patient characteristics that are associated with successfully preventing falls using telemonitoring and additional research is needed.

Theoretical Framework

The theory used to guide this project was the Rational Decision Making Model, which supports using data to make decisions (McEwen & Wills, 2014). This 19th century theory, historically credited to Adam Smith, is related to economics and making decisions that will yield the most worth (Levin & Milgrom, 2004).

According to the Rational Decision Making Model, the problem is easy to identify and is not ambiguous, the goal is clearly defined, all potential alternatives and consequences to action are known to the decision maker, and there are no time or cost constraints. The model includes that the final choice made will have the maximum economic payoff (McEwen & Wills, 2014).

Because some of the tenets of this model are idealistic (such as no time or cost constraints in most projects or decisions), further work by Herbert A. Simon in 1965 contributed the concept of *bounded rationality* to the model (McEwen & Wills, 2014). The concept considers attributes of human nature that result in the inability of human persons to make any absolute rational decisions. *Bounded rationality* resolves that the most "satisfying" decision can still be reached even if all alternatives and consequences are not known. *Bounded Rationality* is an important consideration when utilizing this model to guide any human or healthcare related issues as these fields come with a degree of unpredictability.

Falls are a clearly identified problem and the consequences from patient falls are known through existing research. The information gained through this project may help to identify in more detail the alternatives and consequences in fall prevention, allowing for a rational decision when choosing patients as candidates for telemonitoring to prevent

falls. Cost constraints for this project were minimal, no cost was incurred to collect or analyze data. Realistic time constraints were dictated by the scope of the project and are supported by the bounded rationality concept.

The model appropriately guided the project as the data that was collected and analyzed may potentially help to make the best determination as to which patients may benefit from telemonitoring to prevent falls.

Method

Purpose

The characteristics that are associated with patients that are the most appropriate candidates for video surveillance to reduce fall rates has not been determined due to the use of telemonitoring being new and its sudden increase in use. Therefore, the purpose of this retrospective record review was to identify patient characteristics that are associated with successfully preventing falls using telemonitoring. The information derived from this project may serve to identify patient characteristics that support the use of telemonitoring as the most appropriate intervention.

Design

The design of this project was a descriptive correlational design. Data were collected through a retrospective record review. The investigation identified specific patient characteristics that do or do not correlate to the successful use of telemonitoring to prevent falls.

Sample

Data from a convenience sample of hospitalized, adult patients over the age of eighteen and below the age of 89, who received telemonitoring to prevent falls was utilized. The records included were from telemonitored patients from May 22, 2021 to September 22, 2021. Telemonitoring would need to be utilized for fall prevention (excludes monitoring for other reasons such as primarily for self-harm risk) during the patients' hospital stay for at least 24 hours. Other reasons for telemonitoring may have been potentially indicated but fall risk prevention must be an indication for inclusion in

this project. Patients who did and did not sustain a fall while observed by telemonitoring were included.

Site

A retrospective record review was conducted at a 129 bed Magnet designated community hospital in the Northeast United States. The inpatient units within the acute care facility using the facility's telemonitoring system were included. These were two medical-surgical units, the intensive care unit, and the inpatient rehabilitation unit.

Measurement and data collection

The patient records to be reviewed were identified by the facility's telemonitoring coordinator. The data collected included age (18 to 89), level of patient orientation (available in the nursing assessment flow sheet: person, place, time, situation), and the complete JHFRATs documented throughout the time the patient is monitored on telemonitoring. The JHFRAT data collected included scores describing fall history, elimination patterns, high fall risk medications (opiates, anticonvulsants, anti-hypertensives, diuretics, hypnotics, laxatives, sedatives, and psychotropic medications), the use of patient care equipment (i.e., infusion equipment, chest tube, indwelling catheter), mobility and the need for assistance to transfer, and cognition (environmental awareness, unsteady gait, or sensory deficits). The JHFRAT tool utilized is in Appendix A. The validated JHFRAT is the current method used by this facility and was used for analysis for this investigation (Poe et al., 2018). De-identified data collected was entered into an Excel spreadsheet to allow for further analysis of gathered data and was stored on a password protected computer. The data collection spreadsheet can be found in Appendix B.

Procedures

Permission was obtained from the Chief Nursing Officer of the facility, a letter stating permission was obtained (Appendix C). International Review Board approval from the hospital site organization (Appendix D) and Rhode Island College (Appendix E) was obtained prior to the start of this investigation. The manager overseeing telemonitoring (telemonitoring coordinator) assisted in identifying the sample participants for this project through the existing telemonitoring admission and discharge forms. The data set for this project required specific flow sheet data from the electronic medical record. The flow sheet data included were nursing assessments of orientation, elimination, fall history, high risk medications, patient care equipment in use, and mobility and the complete JHFRAT (appendix A).

The data was collected and reviewed on location at the hospital site in the education department computer lab. All data was accessed via password protected facility computers. Any electronic data was de-identified prior to storage on a password protected computer. No patient identifiers were collected. The primary investigator and I have access to the collected data. Data was stored with the telemonitoring coordinator's existing records in a locked office per existing record keeping policies of the facility.

Analysis

The data was analyzed to correlate the presence or absence of patterns and statistical significance regarding age, orientation, and fall risk assessment characteristics of patients that both did and did not fall while being telemonitored. It was intended for the characteristics for those who did not fall to be compared with those who did fall,

however no patients (during the time frame of data collection for this project) fell while on telemonitoring.

The patient's age (collected in ranges as less than 60, 60-69, 70-79, 80-89) was recorded for those who were on telemonitoring. The percentage of occurrences in each age range were calculated and statistically compared.

The orientation level of the patients on telemonitoring was recorded. The number of patients with each orientation level (to person, to person and place, to person place and time, to person, place, time, and situation) was recorded. The most prevalent assessment of orientation documented was utilized as the overall assessment. The percentage of each occurrence was calculated for patients while telemonitored and compared.

John Hopkins Fall Risk Assessment scores were recorded for each assessment area while the patient is on telemonitoring. The scores for each assessment area were recorded and averaged. The percentage of occurrence for each averaged assessment score for all assessment sections were compared for patients who were telemonitored. If the fall risk assessment indicates a fall during hospitalization before the initiation of telemonitoring or with the first fall risk assessment after initiation, the fall was not considered as occurring while on telemonitoring. If the fall risk assessment indicates a fall during hospitalization after the first assessment after initiation, the fall was considered to have occurred during telemonitoring. This determination was made to account for the situation where a patient may have sustained a fall just before the initiation of telemonitoring and may have been the reason telemonitoring was initiated.

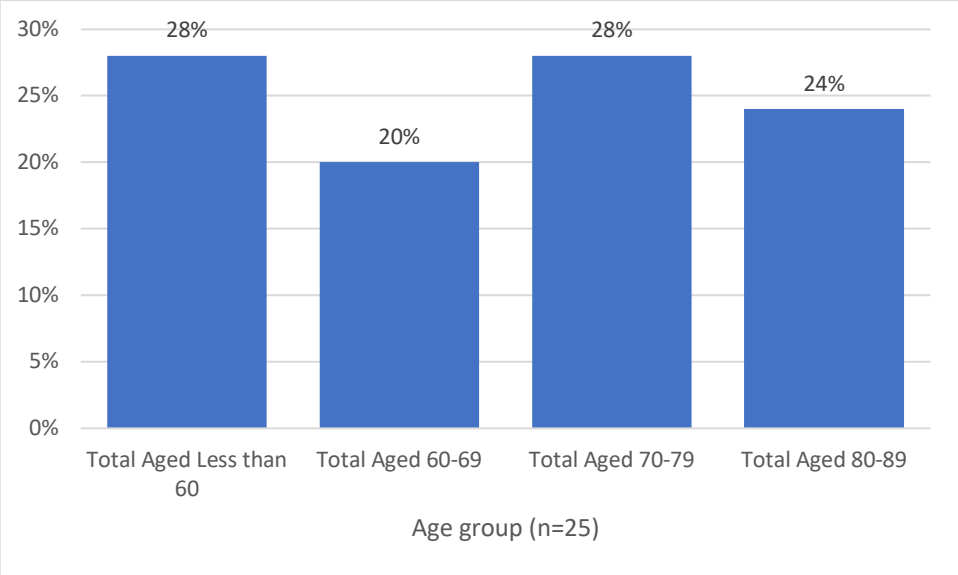
The collected data was compared and analyzed to identify patterns in patient characteristics that are associated with successfully preventing falls using telemonitoring.

Results

A total of 25 records were identified and met the criteria for review and inclusion in this project. None of the records reviewed indicated a fall occurred while on telemonitoring. The percentage of records reviewed with ages less than 60 were 28%, ages 60-69 20%, ages 70-79 28%, and ages 80-89, 24%. Of the 25 records included, 18 of 25 or 72%, were aged 60 years or greater (Figure 1).

Figure 1

Percentage In Age Groups of Telemonitored Patients That Did Not Fall

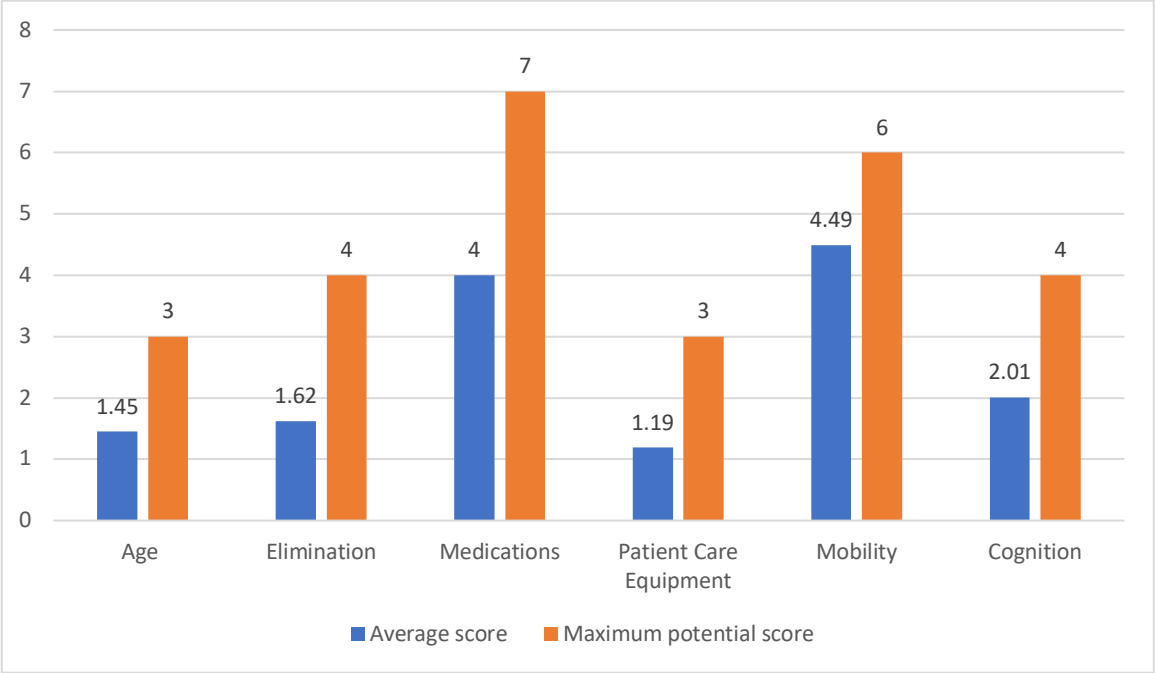


The average fall risk assessment total score for all records reviewed (n=25) was 18.27 (score greater than 13 indicates a high risk of fall). The minimum total score was 10.98 and the maximum score was 24.21. The average fall risk assessment score for age was 1.45, the maximum possible score is 3. The average score for elimination, bowel and urine, was 1.62, with a maximum possible score of 4. The average score for medications was 4, with the maximum score being 7. The average score for patient care equipment was 1.19, maximum score being 3. The average score for mobility was 4.49, with a

maximum score possible of 6. The average score for cognition was 2.01, with the maximum score as assessed in this facility of 4. The minimum possible score for all assessment categories was zero (Figure 2).

Figure 2

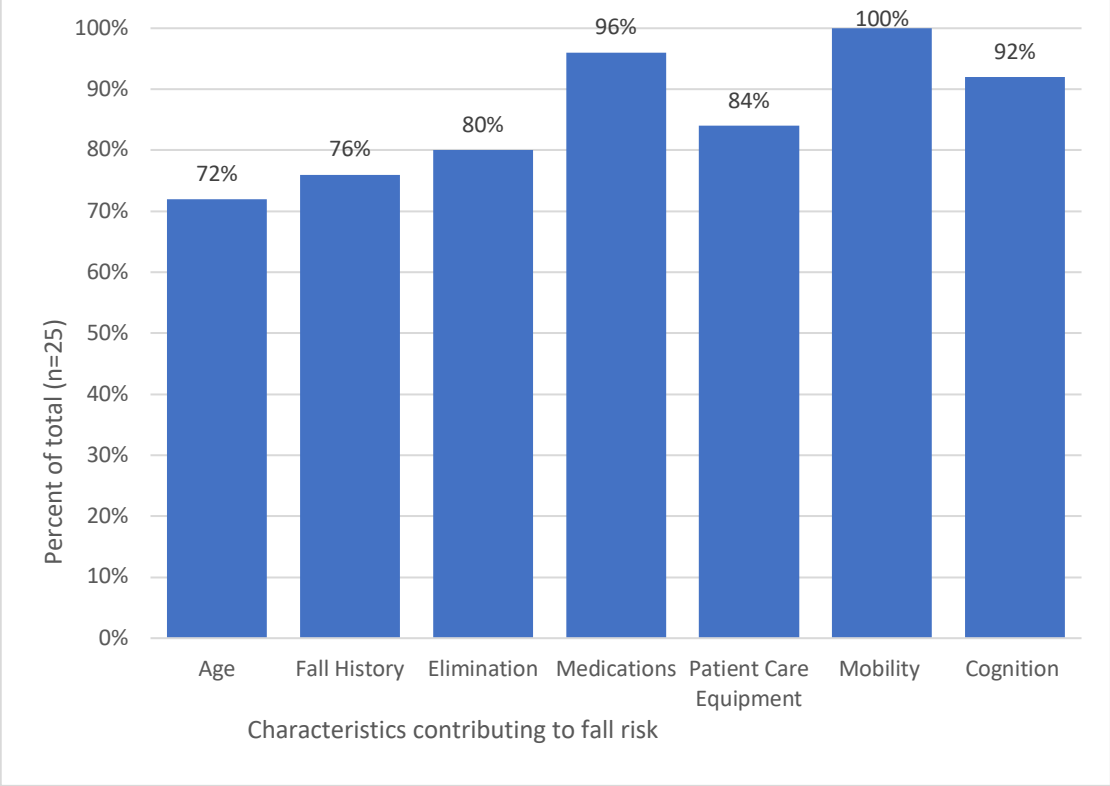
Average JHFRAT Assessment Score



Of the total records included (N=25), 18 of those were patients with an age greater than 60 (72%). 76%, (19) patients were scored for a previous fall history within six months of admission. 80% (20) scored for any type of elimination issues contributing to increased fall risk. 96% (24) of the included records scored for the presence of at least one medication contributing to fall risk. 84% (21) scored for the presence of at least one piece of patient care equipment. 100% of included records (25) scored for mobility as a factor contributing to increased fall risk. 92% scored for th presence of altered cognition (23) (Figure 3).

Figure 3

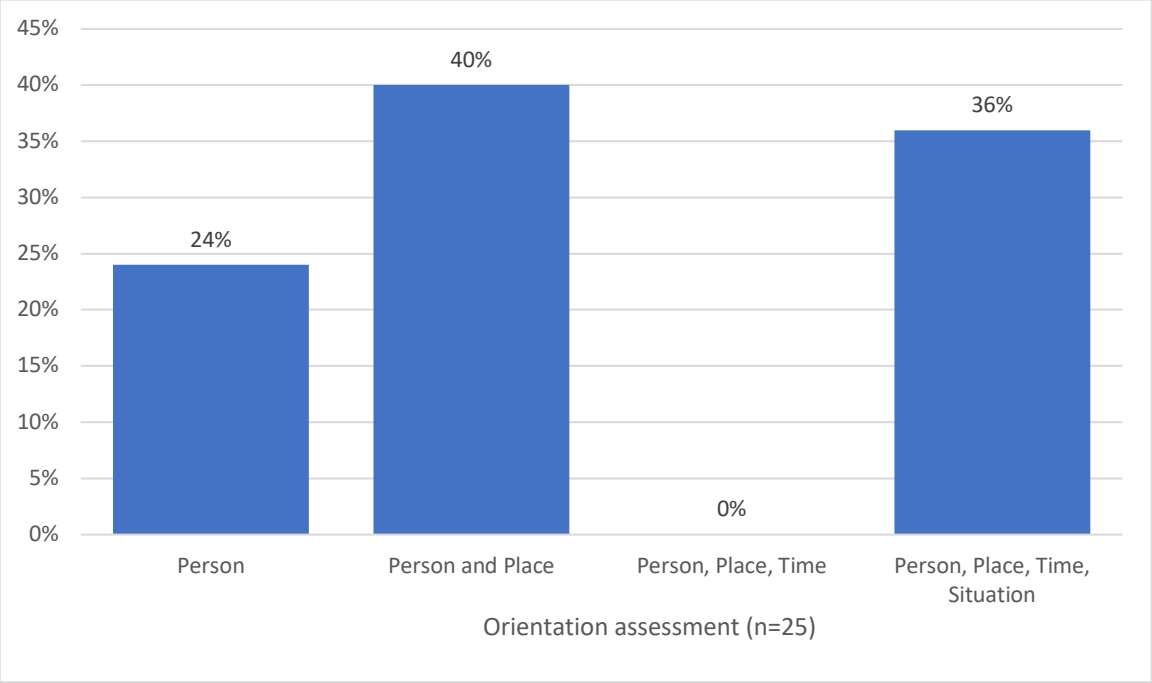
Characteristics Contributing to Fall Risk in Telemonitored Patients Who Did Not Fall



The percentage of records reviewed with orientation assessments "to person" only was 24%, "person and place" 40%, "person, place and time" 0%, and the assessments to "person, place, time, and situation" 36% (Figure 4).

Figure 4

Prevalence of Orientation Assessment of Telemonitored Patients Who Did Not Fall



Summary and Conclusions

Fall prevention is a universal issue addressed daily by healthcare teams working in acute care hospitals. Falls are defined as a "sudden, unintentional descent, with or without injury to the patient, which results in the patient coming to rest on the floor or on some other surface, on another person, or on an object" (Daley et al., 2020, p. 57).

Preventing patient harm through falls is a priority to reduce physical and emotional harm to patients, and also to reduce the additional costs associated with injuries from a patient fall to both the patient and the facility providing patient care (Rohm et al., 2020). One method of fall prevention is through the use of telemonitoring. This is an alternative to patient sitters and has been shown through current evidence that it is an effective method to decrease fall rates. It is at a minimum, equally as effective at preventing falls as is assigning a traditional patient safety attendant or sitter to a patient at an increased risk of falls (Ndoda et al., 2019).

This project reinforces the effectiveness of telemonitoring for patients at high risk of falls. All 25 patient records reviewed indicated that a fall did not occur during telemonitoring, and each average total fall risk score indicated the individual being monitored was at a high risk for falling (score over 13) except for one reviewed record (average fall risk score of 10.98).

The characteristics that are associated with patients that are the most appropriate candidates for video surveillance to reduce fall rates could not be determined due to the use of telemonitoring being new and its sudden increase in use. A retrospective record review was conducted to identify patient characteristics that are associated with successfully preventing falls using telemonitoring.

The percentage of patients in each age range where telemonitoring was implemented for fall prevention (younger than 60, 60 to 69, 70 to 79, and 80 to 89) ranged from 20% to 28%. Of these patients who did not sustain a fall while on telemonitoring, 72% were over age sixty. Based on the data collected, age did not contribute to successful fall prevention on telemonitoring. The literature supports older age as a risk for falls (Poe et. al, 2018). More data is needed to determine a correlation between age and successful telemonitoring to prevent falls.

The specific fall risk characteristics as measured by the JHFRAT show that each category (age, fall history, elimination, medication, patient care equipment, mobility, and cognition) were scored as contributing to fall risk at a minimum in 72% of the records reviewed. The least prevalent assessment was in the characteristic of age at 72%. This may be reflective of the even distribution of age ranges recorded in patients who did not fall while telemonitored and may indicate that age does not contribute to the successful prevention of falls with telemonitoring. More data is needed to support this inference.

The most prevalent assessment contributing to increased fall risk was mobility at 100%. Mobility also had the highest average JHFRAT assessment score in relation to the highest maximum assessment possible (average score 4.49 out of maximum of 6). This may support that mobility issues that increasing the risk for falls are a characteristic that is associated with the successful use of telemonitoring for fall prevention.

The second most prevalent assessment was in the category of medications contributing to fall risk. Ninety six percent of the patient records reviewed scored for the use of medications considered to increase fall risk. This may support that the presence of

high fall risk medications (i.e. laxatives) are associated with successful use of telemonitoring in patients on these medications.

Patients who were oriented to person and place were the most prevalent, with 40% of these patients with successful fall prevention while on telemonitoring. Patients who were oriented to person, place, time, and situation were the next most prevalent group at 36%. The patients who were assessed as oriented to self were the least prevalent group at 24%. This may support the inference that a higher level of orientation correlates with successful telemonitoring. 92% of the records reviewed were scored on the JHFRAT with cognition contributing to fall risk, the third most prevalent characteristic The average assessment score was 2.01 out a maximum score of 4. A more oriented person may be more likely to be able to be re-directed by the telemonitoring observer versus a less oriented person (to person only) who is unable to comprehend their circumstances or follow directions. This conclusion is limited by the fact that there were no records reviewed of patients who sustained a fall with telemonitoring to compare characteristics.

Fall history was scored as contributing to increased fall risk in 76% percent of the records reviewed. Elimination in 80% of the records reviewed, and Patient care equipment in 84% of the records reviewed. These remaining characteristics were present at a high percentage (greater than 76%) in the reviewed records but were the least prevalent (excepting age as previously discussed). Based on the high percentage of presence in the assessment scores for these characteristics, they are likely associated with successful telemonitoring but more data is needed to make this conclusion.

Limitations to this project included a small sample size (n=25) and the absence of records reviewed where the patient where telemonitoring was used and the patient

sustained a fall for comparison. The sample size may have been affected by the facility starting to use telemonitoring only three months before the inclusion date for this project. Other limiting factors included potential inaccuracies of flowsheet assessments used for analysis due to potential error during entry. Confounding factors to the collected data are patients on telemonitoring for falls may have also had other indications for observation (such as elopement or staff injury) but were able to be included regardless of this fact as long as they were being observed for falls. Other indications for telemonitoring were not recorded or taken into account in the collected data.

Recommendations and Implications for Advanced Nursing Practice

Implications for advanced nursing practice include the use of novel technologies such as telemonitoring to maintain patient safety while using resources in a cost effective and efficient way. The advanced practice nurse can act in their role as a leader to implement evidence-based technologies such as telemonitoring systems.

Votruba et al. (2016) found that telemonitoring was an effective intervention for fall prevention and more effective than patient companions. Decreasing the use of patient companions, or patient sitters, can potentially allow for staff to be available for other patient care tasks without sacrificing patient safety in situations where a patient sitter would be warranted for fall prevention. Utilizing telemonitoring as an alternative to patient sitters may help to support facilities re-deploy staff who would be sitters into other roles where additional staff is required.

Utilizing evidence to determine who may best benefit from interventions such as telemonitoring is a potential strategy to optimize patient safety and outcomes and maximize the use of healthcare resources. Data that supports the use of telemonitoring to prevent falls may potentially help to reassure staff who are doubtful of the effectiveness telemonitoring in comparison to the traditional methods of fall prevention (i.e., patient sitters).

Data from this project and similar projects can potentially be used to educate staff surrounding the implementation of telemonitoring and how to identify fall risk characteristics in candidates associated with the successful use of telemonitoring when used for fall prevention. Additional data is needed, but the characteristics that are associated with successful fall prevention could be used to support decision making

algorithms used to decide if telemonitoring or a patient sitter is the most appropriate intervention to maintain patient safety.

Delivering quality care, maintaining patient safety, and improving outcomes while managing costs is integral. This can best be done when evidence supports the methods and decisions when determining how to accomplish these goals.

References

Daley, B., Fetherman, B., & Turner, J. (2020). Staffing utilization and fall prevention with an electronic surveillance video system: A randomized controlled study. *Journal of Nursing Care Quality, 36*(1), 57-61.

Cho, E. H., Woo, Y.J., Han, A, Chung, Y.C., Kim, Y.H, and Park, H.A., (2020). Comparison of the predictive validity of three fall risk assessment tools and analysis of fall-risk factors at a tertiary teaching hospital. *Journal of clinical nursing, 29*, 3482-3493.

Greeley, A. M., Tanner, E. P., Mak, S, Begashaw, M. M., Miake-Lye, I. M., and Shekelle, P. G., (2020). Sitters as a patient safety strategy to reduce hospital falls: A systematic review. *Annals of internal medicine, 172*(5), 317-324.

Institute for John Hopkins Nursing. (2007). John Hopkins fall risk assessment tool [fall risk assessment instrument]. Retrieved from https://www.hopkinsmedicine.org/ institute_nursing/models_tools/fall_risk.html

Lang, C. (2014). Do sitters prevent falls?: A review of the literature. *Journal of Gerontological Nursing, 40*(5), 24-33. Retrieved from https://journals-healio-com.ric.idm.oclc.org/doi/10.3928/00989134-20140313-01

Leone, R.M., & Adams, R.J. (2015). Safety standards: Implementing fall prevention interventions and sustaining lower fall rates by promoting the culture of safety on an inpatient rehabilitation unit. *Rehabilitation nursing, 41*, 26-32.

Levin, J., & Milgrom, P., (2004). Introduction to choice theory. Retrieved from https://web.stanford.edu/~jdlevin/Econ%20202/Choice%20Theory.pdf

McEwen, M. & Wills, E. M. (2014) *Theoretical basis for nursing* (4th ed.). Philadelphia, PA: Lippincott Williams & Wilkins.

Ndoda, K., Fechner, J., Wodekemper, J., & Kniewel, M. (2019). Video monitoring for fall prevention in the hospital: Current evidence and considerations. *Journal of Informatics Nursing, 4*(4), 30-36.

Poe, S. S., Dawson, P. B., Cvach, M., Burnett, M., Kumble, S., Lewis, M., Thompson, C. B., & Hill, E. E. (2018). The Johns Hopkins fall risk assessment tool: A study of reliability and validity. *Journal of Nursing Care Quality*, *33*(1), 10–19. https://doi-org.ric.idm.oclc.org/10.1097/NCQ.0000000000000301

Purvis, S., Kaun, A., McKenna, A., Viste, J.W., & Fedorov, E., (2018). Outcomes of clinical nurse specialist practice in the implementation of video monitoring at an academic medical center. *Clinical Nurse Specialist, 32*(2). 90-96. Retrieved from ttps://oce-ovid-com.ric.idm.oclc.org/searchResults?q=0887-6274.is and 2018.yr and 32.vo and 2.ip and 90.pg and purvis*.au&req=HTML

Quigley, P.A., Votruba, L., & Kaminski, J. (2019). Outcomes of patient-engaged video surveillance on falls and other adverse events. *Clinics in Geriatric Medicine 35*(2) 253

Rohm, C. D., Biearman, B.S., Whiteman, K., & Stephens, K. (2020). Interprofessional collaboration to reduce falls in the acute care setting. *MEDSURG Nursing*, *29*(5), 303–307.

Spano-Szekely, L., Winkler, A., Waters, C., Dealmeida, S., Brandt, K., Williamson, M., Blum, C., Gasper, L., & Wright, F. (2019). Individualized fall prevention program in an acute care setting: An evidence-based practice improvement. *Journal of Nursing Care Quality*, *34*(2), 127–132. https://doi.org/10.1097/NCQ.0000000000000344

The Joint Commission. (2015). Preventing falls and fall-related injuries in health care facilities. *Sentinel Event Alert, 55*(1), 1-5. Retrieved from https://www.jointcommission.org/-/media/tjc/documents/resources/patient-safety-topics/sentinel-event/sea_55_falls_4_26_16.pdf

Vancil, B., Michael, L., Wagoner, J., Farkas, B., Evans, K., Pasley, T., Garcia, A., Peppers, S., Belfield, H., & Gregory, K. (2020). Improving patient sitter use with care companions. *Nursing Management, 51*(11), 47-53. Retrieved from https://oce-ovid-com.ric.idm.oclc.org/article/00006247-202011000-00007/HTML

Votruba, L., Graham, B., Wisinksi, J, Syed, A., (2016). Video monitoring to reduce falls and patient companion costs for adult inpatients. *Nursing economics, (34)*4, 185-189.

Appendix A

John Hopkins Fall Risk Assessment Tool (Institute for John Hopkins Nursing, 2007)

Johns Hopkins
Fall Risk Assessment Tool

If patient has any of the following conditions, check the box and apply Fall Risk interventions as indicated.

High Fall Risk - Implement High Fall Risk interventions per protocol
- ☐ History of more than one fall within 6 months before admission
- ☐ Patient has experienced a fall during this hospitalization
- ☐ Patient is deemed high fall-risk per protocol (e.g., seizure precautions)

Low Fall Risk - Implement Low Fall Risk interventions per protocol
- ☐ Complete paralysis or completely immobilized

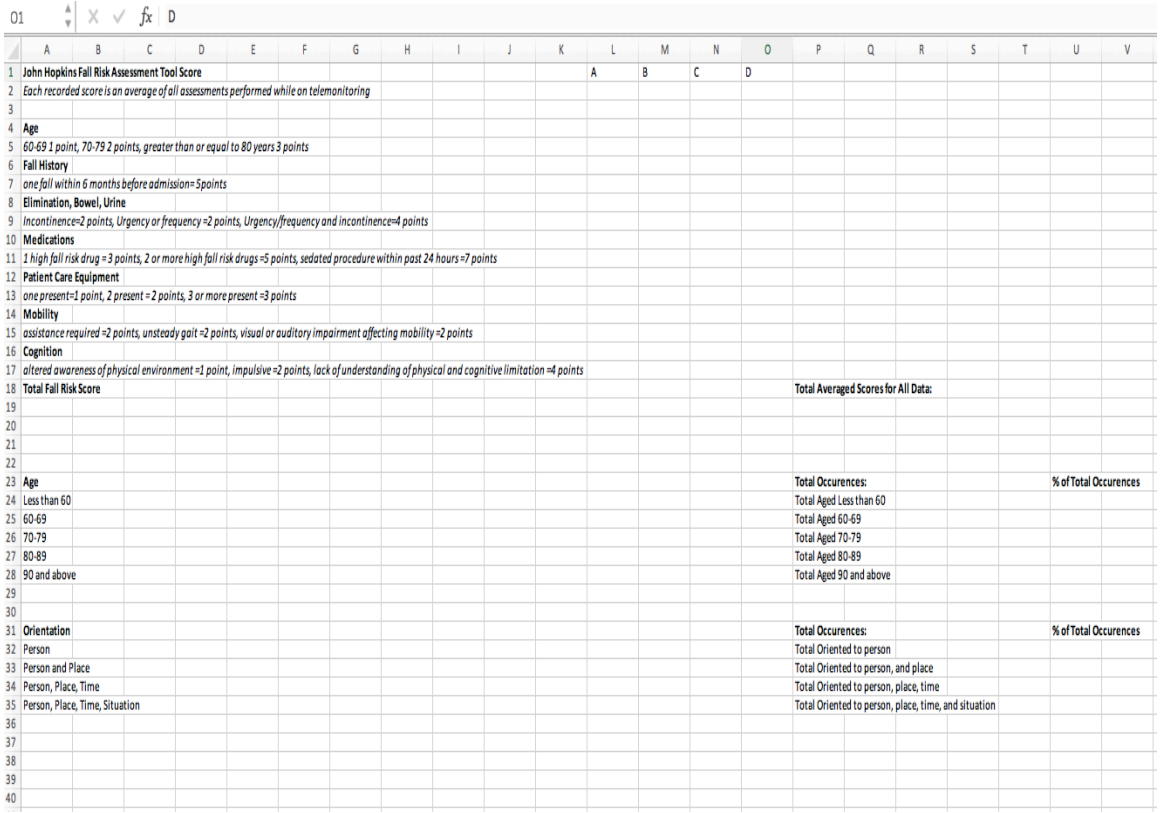
Do not continue with Fall Risk Score Calculation if any of the above conditions are checked.

FALL RISK SCORE CALCULATION – Select the appropriate option in each category. Add all points to calculate Fall Risk Score. (If no option is selected, score for category is 0)	**Points**
Age *(single-select)* ☐ 60 - 69 years (1 point) ☐ 70 -79 years (2 points) ☐ greater than or equal to 80 years (3 points)	
Fall History *(single-select)* ☐ One fall within 6 months before admission (5 points)	
Elimination, Bowel and Urine *(single-select)* ☐ Incontinence (2 points) ☐ Urgency or frequency (2 points) ☐ Urgency/frequency and incontinence (4 points)	
Medications: Includes PCA/opiates, anticonvulsants, anti-hypertensives, diuretics, hypnotics, laxatives, sedatives, and psychotropics *(single-select)* ☐ On 1 high fall risk drug (3 points) ☐ On 2 or more high fall risk drugs (5 points) ☐ Sedated procedure within past 24 hours (7 points)	
Patient Care Equipment: Any equipment that tethers patient (e.g., IV infusion, chest tube, indwelling catheter, SCDs, etc.) *(single-select)* ☐ One present (1 point) ☐ Two present (2 points) ☐ 3 or more present (3 points)	
Mobility *(multi-select; choose all that apply and add points together)* ☐ Requires assistance or supervision for mobility, transfer, or ambulation (2 points) ☐ Unsteady gait (2 points) ☐ Visual or auditory impairment affecting mobility (2 points)	
Cognition *(multi-select; choose all that apply and add points together)* ☐ Altered awareness of immediate physical environment (1 point) ☐ Impulsive (2 points) ☐ Lack of understanding of one's physical and cognitive limitations (4 points)	
Total Fall Risk Score (Sum of all points per category)	
SCORING: 6-13 Total Points = Moderate Fall Risk, >13 Total Points = High Fall Risk	

JOHNS HOPKINS MEDICINE

Appendix B

Sample Excel Work Sheet for Data Collection



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
1	**John Hopkins Fall Risk Assessment Tool Score**											A	B	C	D							
2	*Each recorded score is an average of all assessments performed while on telemonitoring*																					
3																						
4	**Age**																					
5	*60-69 1 point, 70-79 2 points, greater than or equal to 80 years 3 points*																					
6	**Fall History**																					
7	*one fall within 6 months before admission= 5points*																					
8	**Elimination, Bowel, Urine**																					
9	*Incontinence=2 points, Urgency or frequency =2 points, Urgency/frequency and incontinence=4 points*																					
10	**Medications**																					
11	*1 high fall risk drug = 3 points, 2 or more high fall risk drugs =5 points, sedated procedure within past 24 hours =7 points*																					
12	**Patient Care Equipment**																					
13	*one present=1 point, 2 present = 2 points, 3 or more present =3 points*																					
14	**Mobility**																					
15	*assistance required =2 points, unsteady gait =2 points, visual or auditory impairment affecting mobility =2 points*																					
16	**Cognition**																					
17	*altered awareness of physical environment =1 point, impulsive =2 points, lack of understanding of physical and cognitive limitation =4 points*																					
18	**Total Fall Risk Score**															**Total Averaged Scores for All Data:**						
19																						
20																						
21																						
22																						
23	**Age**															**Total Occurences:**					**% of Total Occurences**	
24	Less than 60															Total Aged Less than 60						
25	60-69															Total Aged 60-69						
26	70-79															Total Aged 70-79						
27	80-89															Total Aged 80-89						
28	90 and above															Total Aged 90 and above						
29																						
30																						
31	**Orientation**															**Total Occurences:**					**% of Total Occurences**	
32	Person															Total Oriented to person						
33	Person and Place															Total Oriented to person, and place						
34	Person, Place, Time															Total Oriented to person, place, time						
35	Person, Place, Time, Situation															Total Oriented to person, place, time, and situation						
36																						
37																						
38																						
39																						
40																						

Appendix C

Chief Nursing Officer Approval

September 8, 2021

Dear Lifespan Institutional Review Board:

I am writing to you today to express my full support for exempt status of the proposal "Fall Prevention Utilizing Telemonitoring: Patient Characteristics Associated with Effective Fall Prevention", submitted by Kathleen Fournier, BSN, RN-BC at Newport Hospital. The reduction of falls is important to decrease hospital length of stays, injuries, and costs to the organization. In 2015, The Joint Commission issued a sentinel event alert outlining the widespread and detrimental nature of falls in healthcare facilities.

This research team led by Kathleen Fournier, BSN, RN-BC and mentored by Jean Salera-Vieira, DNP, PNS, APRN-CNS, RNC, Perinatal Clinical Nurse Specialist, will observe fall prevention with the use of telemonitoring on Turner 2 and Turner 4, the Intensive Care Unit, and Vanderbilt Rehabilitation Units at Newport Hospital. The validated John Hopkins Fall Risk Assessment Tool will be analyzed for patients who have been assigned to telemonitoring to prevent falls, in addition to age range and level of orientation. The analysis of these documented characteristics will be used to help clarify which patients will most likely benefit from the use of telemonitoring for fall prevention. Telemonitoring has been shown to decrease fall rates while reducing the cost of patient sitters.

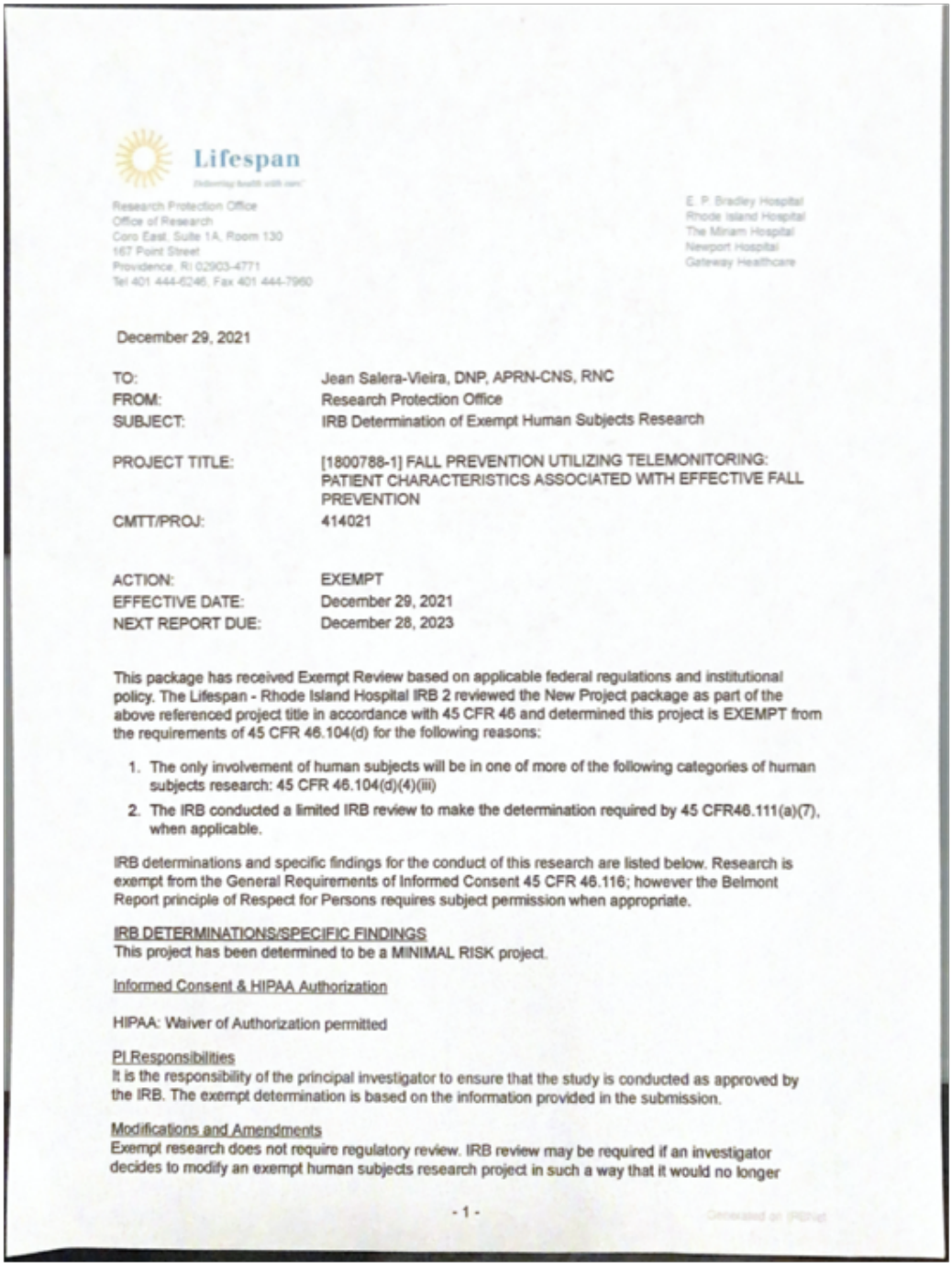
Due to the quality improvement nature of this proposed project, I fully support the request for exempt status.

Orla Brandos

Orla Brandos, DNP, RN, MBA, CPHQ, NEA-BC, FACHE
Vice President of Patient Care Services & Chief Nursing Officer
Newport Hospital

Appendix D

Facility IRB Approval



Lifespan

Research Protection Office
Office of Research
Coro East, Suite 1A, Room 130
167 Point Street
Providence, RI 02903-4771
Tel 401 444-6246, Fax 401 444-7960

E. P. Bradley Hospital
Rhode Island Hospital
The Miriam Hospital
Newport Hospital
Gateway Healthcare

December 29, 2021

TO:	Jean Salera-Vieira, DNP, APRN-CNS, RNC
FROM:	Research Protection Office
SUBJECT:	IRB Determination of Exempt Human Subjects Research
PROJECT TITLE:	[1800788-1] FALL PREVENTION UTILIZING TELEMONITORING: PATIENT CHARACTERISTICS ASSOCIATED WITH EFFECTIVE FALL PREVENTION
CMTT/PROJ:	414021
ACTION:	EXEMPT
EFFECTIVE DATE:	December 29, 2021
NEXT REPORT DUE:	December 28, 2023

This package has received Exempt Review based on applicable federal regulations and institutional policy. The Lifespan - Rhode Island Hospital IRB 2 reviewed the New Project package as part of the above referenced project title in accordance with 45 CFR 46 and determined this project is EXEMPT from the requirements of 45 CFR 46.104(d) for the following reasons:

1. The only involvement of human subjects will be in one of more of the following categories of human subjects research: 45 CFR 46.104(d)(4)(iii)
2. The IRB conducted a limited IRB review to make the determination required by 45 CFR46.111(a)(7), when applicable.

IRB determinations and specific findings for the conduct of this research are listed below. Research is exempt from the General Requirements of Informed Consent 45 CFR 46.116; however the Belmont Report principle of Respect for Persons requires subject permission when appropriate.

IRB DETERMINATIONS/SPECIFIC FINDINGS
This project has been determined to be a MINIMAL RISK project.

Informed Consent & HIPAA Authorization

HIPAA: Waiver of Authorization permitted

PI Responsibilities
It is the responsibility of the principal investigator to ensure that the study is conducted as approved by the IRB. The exempt determination is based on the information provided in the submission.

Modifications and Amendments
Exempt research does not require regulatory review. IRB review may be required if an investigator decides to modify an exempt human subjects research project in such a way that it would no longer

Appendix E

Rhode Island College IRB Approval

From: NoReply@TOPAZTI.net <NoReply@TOPAZTI.net>
Sent: Wednesday, January 12, 2022 12:54 PM
To: Dame, Linda M. <ldame@ric.edu>; Institutional Review Board - Rhode Island College <irb@ric.edu>
Subject: IRB: #2122-2263 (Dame, Linda) approved

Greetings,

The proposal for the project referenced below has been DETERMINED EXEMPT by the Institutional Review Board (IRB).

Project title: Patient Characteristics Associated with Effective Fall Prevention Utilizing Telemonitoring

Approval #: 2122-2263
Type of review: EXEMPT
Proposal type: Original
Principle Investigator: Dame, Linda
Fees received: 1. No fees -- RIC supervised or sponsored
Funding status:

You do not need to submit any renewals for this project.
An exemption is not the same as approval. This protocol has been reviewed to ensure it meets the criteria for an exemption, but it has not been reviewed for approval. Investigators are encouraged to adhere to the same ethical standards of research for non-exempt research. References to the IRB status cannot say that it was approved, but must say that the study was determined to be Exempt from Continuing Review. Any changes to the scope or methods of your research may change its status and must be reviewed by the IRB before implementation.

Best Regards,

Emily Cook, Ph.D.
Professor
Chair, IRB
Rhode Island College
IRB@ric.edu