The Implementation of Call Bells and Exit Alarms on a Psychiatric Unit

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Abstract

Fall prevention is a long-standing challenge in many areas of healthcare. While millions have been spent to develop techniques to reduce falls for patients on medical units. This is not the case in psychiatric units. There is a severe lack in implementable research-based techniques currently used to reduce falls in psychiatric units, especially at the bedside and in the bathroom. This project implemented research-based tools that are widely used in medical units to test their effectiveness in falls reduction in psychiatric units. Exit alarms and call bells were provided to patients that were considered high risk according to the psychiatric specific Wilson Sims Fall Scale. The project examined if these tools are helpful to reduce falls. It documented the effects on perceived nursing workload and on improved communication of patient needs to staff. The project was conducted in four phases: Education, Deployment, Survey, and Data analysis. The number of and location of falls during the four months before and after implementation of the intervention were compared, as well as nominal data from the reasons for eligible patients not receiving the intervention. Nominal data from the survey was also analyzed. The study examined open ended log and survey data to identify any patterns in responses. Results of falls date showed an overall reduction of falls, but statistical significance could not be established. Falls data showed a reduction of falls in the bedroom and bathroom. Nursing Survey revealed that nurses felt that call bells and exit alarms are helpful to communicate their patients' needs, helped to prevent patients from falling, and that both exit alarms and call bells more effective in preventing falls than either one intervention individually. Nurse were evenly split on if they felt that using call bells and exit alarms had reduced work load.

Key terms: Psychiatric Hospitals, Psychiatric Involuntary Unit, Hospital Psychiatric Department, bed alarm, exit alarm, call bell, falls, accidental falls, falls prevention.

The Implementation of Call Bells and Exit Alarms on a Psychiatric Unit

Introduction

An inpatient fall is defined as "an unplanned descent to the floor with or without injury" (Agency for Healthcare Research and Quality, 2013). Fall prevention has been a goal for many years and has been studied in many ways. The CDC spent over \$24.9 million in fall research and programs from 1985 to 2005 (Sleet, 2008). Despite the attention the issue has received and the increase in evidence-based interventions, falls continue be a common and devastating complication of inpatient care, representing significant costs to hospitals and risk to patients. After the institution of falls prevention techniques in New Jersey hospitals have been able to avoid 43% of falls, saving approximately \$552,236 a year (NJHA Health Research & Educational Trust of NJ, 2018). Falls and their consequences are reducible although they may not be completely preventable. Continued efforts to mitigate and further reduce falls are necessary. Call devices like call bells and exit alarms have been studied extensively in medically hospitalized patients, but there was relatively little research into their use with high fall risk patients in inpatient psychiatric units. In practice, many inpatient psychiatric institutions borrow these strategies from the medical field despite minimal direct evidence to support their use in psychiatric care. It is important to study their use in this population so as to determine if they are appropriate and effective in preventing falls and to provide evidence for or against implementing them in this setting. This project implemented call devices such as call bells and exit alarms in an inpatient psychiatric unit to observe their impact on the number of falls over a specific time period and have a better understanding of nurses' opinions regarding their efficacy and their effects on workload.

Background and Significance

Psychiatric units experience significantly higher rates of falls than medical units (3.1 to 3.7 per 1000 occupied bed days in medical facilities compared to 4.1 to 6.4 per 1000 occupied bed days in psychiatric facilities in a review of 7 studies) (Scanlan, 2012). Of the 559 falls examined in Scanlan's study, most falls occurred in bedrooms and bathrooms, while walking or transferring. According to a systemic review of 35 studies, the mean age of inpatients who fall while at a mental health unit tends to be younger (mean age of 56) compared to those in medical units (patients aged 70 and up are at greater risks of falls) (McMinn et al, 2016). Compared to medical patients, psychiatric patients have a higher risk of falling due to being more mobile and having more interaction with other patients, especially at night when staffing and supervision are lower (McMinn, 2016). Psychiatric units present many unique fall-risk factors that are not present on medical units. For example, according to a systematic review of 11 studies on falls and fall prevention in psychiatric facilities, the effects of psychiatric conditions may result in erratic or reckless movements, medication side effects can alter awareness of surroundings, gait and body awareness, and changes in mental status can also increase fall risk (Xu, 2015). According to a retrospective case-control study of 774 psychiatric patients, the majority of falls on psychiatric units occur with patients that take regularly prescribed psychiatric medications such as non-benzodiazepine sleep aides, benzodiazepines, antipsychotics, lithium, atypical antidepressants, and anticonvulsants. Patients with psychiatric diagnosis can also have medical problems and may be prescribed medical medications such as alpha-blockers, laxatives, H2 blockers, and stool softeners which also can contribute to risk of falls (Lavsa, 2010). The majority of patients on the proposed unit of study have both psychiatric and medical conditions that require these medications; patients can be prescribed multiple medications that cause falls. Other fall risk conditions that are present in psychiatric hospitals include degenerative brain

disorders like Alzheimer's and Parkinsons as well as delirium from alcohol and benzodiazepine withdrawal (McMinn et al in 2016). These unique issues pose specific challenges in psychiatric units that make falls prevention even more difficult and specific.

To better understand the problem of fall prevention for psychiatry patients, it is important to find research-based solutions that can decrease the likelihood of falls. Medical research on fall reduction has found that call bells help to reduce falls. Notably, Hoke and Guarracino (2016) performed an implementation study of an accountability model implemented in a 48-bed cardiac intermediate care unit where falls reduced by 55% in the first year and 72% in the second year of implementation. They found that call bells have a higher chance of decreasing falls when responded to within 60 seconds.

These findings have been adapted on an ad hoc basis with some modifications in psychiatric settings. For example, according to Veterans Affairs design guidelines for psychiatric units, call cords should not be used because of possible use for strangulation. Instead, they recommend that call devices should be used without strings (Department of Veterans Affairs, 2017). Similarly, the Agency for Healthcare Research and Quality recommends using bed and chair alarms to reduce falls in geriatric psychiatric patients (Glogovsky, 2017). One study of 47 geriatric medical patients suggests that the use of modular bed absence sensor devices significantly reduced falls with 100% sensitivity (K. Subermaniam, Welfred, R., Subramanian, P., Chinna, K., Ibrahim, F., Mohktar, M., & Tan, M. , 2017). This same study also showed that nurses experienced a lower nuisance alarm rate and helped to reduce the NASA-TLX workload score significantly for nurses (based on a survey of 30 nurses working at that geriatric ward, Subermaniam et al, 2017). A randomized trial in 4 urban hospitals with 10,264 medical patients found that number of falls can further be reduced significantly when chair and bed exit alarms are combined with other fall prevention techniques and implemented with reminders in electronic medical record technology (Dykes, 2010).

Hospitals need to reduce falls as much as possible not only for patient safety but for their bottom line. The cost of a fall in a hospital with injury is on average \$14,000 (The Joint Commission, 2015). The cost of these expensive hospital acquired conditions are not covered by Medicaid making it the responsibility of the hospital to pay according to section 2702 of the Patient Protection and Affordable Care Act ("The Patient Protection and Affordable Care Act," 2010). This being said, call bells and bed alarms have the potential to reduce workload, reduce negative outcomes from falls for patients, and help the bottom line for hospitals.

Up to this point there was minimal evidence that directly pointed to the effectiveness of the use of call bells and exit alarms in the psychiatric setting, if they would be used properly, if they would increase or decrease safety on the unit, and if staff would accept them as useful tools. The only way to understand this would be to test them in this setting. Few actual studies have been made on how to specifically implement call bells or exit alarms on psychiatric units. In fact, there were very few robust studies into implemented fall prevention strategies in mental health facilities according to one systemic review of falls prevention in mental health (Bunn F, 2014). The lack of evidence was why it was important to implement and study the use of call devices and exit alarms on a psychiatric unit that does not currently use them, that could potentially benefit from their use. The knowledge from research related to call bell use in falls prevention was translated and tailored to a specific psychiatric unit. This process could then be studied and improved upon for future strategies in fall prevention on other psychiatric units. Education on the proper use of these devices was also required for appropriate application of them in testing. These interventions should be applied, educated on, and tested throughout the hospital system involved in the study and to other hospital systems.

Needs Assessment

Falls on psychiatric units continue to be a severe problem despite interventions to prevent them, yet there are few studies of implementable fall reduction techniques specific to the field of psychiatry (McMinn, 2016). Without fall reduction techniques that are effective, these falls will continue.

Falls cost US hospitals and patients an average of \$50 billion a year, with Medicare and Medicaid paying out approximately \$37.6 billion (Florence et al., 2018). As a response to these high costs to the government, the Affordable Care Act introduced the Hospital-Acquired Condition (HAC) Reduction Program where hospitals that have high number of HACs such as falls, would receive a 1% reduction in payments from Medicare and Medicaid (The Centers for Medicare and Medicaid Services, 2018b).

On a state level, fifteen New Jersey hospitals in 2018 reduced Medicare reimbursement due to falls and other hospital acquired injuries as part of the Affordable Care Act's HAC Reduction Program (Washburn, 2018). The 25 percent worst-performing hospitals according to the HAC quality measures are subjects to a 1 percent payment reduction.(Centers for Disease Control and Prevention, 2020) The reduction in reimbursement can have a potentially significant impact funding for hospitals as Medicare is the largest payer for healthcare, paying out a total of \$26 billion to New Jersey hospitals in 2014 alone (The Centers for Medicare and Medicaid Services, 2018a). To put it in perspective, if all of the hospitals in New Jersey were to lose 1% of what Medicare paid them, they could potentially lose \$260 million, making a large hit to New Jersey's economy. More specifically, at the level of the hospital where the present study was implemented, 17 falls occurred in the psychiatric inpatient unit in 2018, mostly related to balance and transfers (unpublished falls numbers from the urban hospital of study, 2018). Although several other hospitals in this system had started to use metal or electronic call bells in their psychiatric units to prevent falls and although prompts to encourage using call bells properly were already integrated into the hospital system wide electronic medical record system (CERNER), the hospital unit studied in this project had not implemented call bells for its inpatient psychiatric patients (Director of nursing of urban Jersey City hospital, personal communication, April 5, 2019). None of the psychiatric units in the hospital system were using Exit alarms such as bed exit and chair exit alarms, but they had expressed interest and were actively looking for exit alarms that would be safe to use in a psychiatric setting at the time this study was proposed (Director of nursing of urban Jersey City hospital, personal communication, April 5, 2019).

Needs were discussed with the Director of Nursing in behavioral health, as well as the unit director, and several nurses. Fall prevention guidelines were reviewed for the hospital containing the proposed unit of study. Unlike the other institutions in the hospital system, the proposed unit of study was not using any form of call bell system at the time the study was proposed. The proposed unit of study was not using exit alarms, despite the hospital system's Psych Subcommittee's effort to find a system that would be safe to use in the psychiatric setting. Preliminary interviews with nurses showed that they would be interested in the advantage of having a call bell and/or exit alarm for fall risk patients (five staff nurses, personal communication, April 5, 2019).

Instead of using call bells, the previous practice for fall prevention in the unit of study was to have fall risk ID bands on the patient and fall risk signs on their patient door. Patients were also reminded to wear slip resistant footwear or yellow socks as well as their fall ID band. A "falls teach back tool" was employed each shift to ask patients what they should do to prevent a fall, what staff can do to prevent a fall, as well as what the falls identification bands and signs mean. Patients were also rounded on every 15 minutes. Vital signs were taken at 7am and 3pm and compared to the early warning score system (EWSS) which scores vital signs within ranges to show what patients were at high risk of potential complications (Director of nursing of urban Jersey City hospital, personal communication, April 5, 2019). The unit of study used the Wilson Sims Fall Scale, which is a psychiatric specific falls screening which identifies high falls risks through assessing age, gender, mental status, physical status, elimination independence, physical impairments, gait and balance, history of falls, use of mood stabilizers, use of benzodiazepines, use of narcotics, sedative hypnotic use, atypical antipsychotic use, and whether or not the patient was on detox protocol (Billeen, 2013). Medications were reviewed by pharmacists; pharmacy provides suggestions to doctors as well as education to nurses on the potential for fall with certain medications (Director of nursing of urban Jersey City hospital, personal communication, April 5, 2019).

While these interventions were recognized as being helpful in identifying patients with fall risk and in preventing patients from becoming higher fall-risks, they did not respond to situations where a patient was in present danger of falling or needed immediate assistance following a fall. The present research project responded to the latter needs.

Problem Statement

Medical research on the use of call bells and exit alarms for falls preventions has not been tested or adapted to the specific needs of psychiatric care, resulting in ad hoc and uneven knowledge and use in general. More specifically, in the hospital unit studied here, existing solutions to address falls were focused on identifying risk and general prevention and were inadequate to respond to immediate needs in cases of imminent or recent falls. Patients who need help did not have access to communicate their needs with staff on the unit and may not have been able to vocally call for help due to weakness, dementia, delirium, or psychosis. Although patients were rounded on every 15 minutes, they may have required help before that and rounding times may vary depending on activity on the unit.

Clinical Question

In psychiatric patients on the proposed unit of study who were considered fall risks identified by the Wilson-Sims Fall Risk Assessment Tool, would implementing call bells and exit alarms be effective in reducing falls compared to current practice, within 4 months and would this change perceived nursing workload as well as communication of patient needs?

Aims and Objectives

The aim of this study was to implement call bells and exit alarms in an attempt to reduce falls and improve communication with patients in a psychiatric hospital. The objective was to reduce the number of falls with the implementation of call bells and exit alarms with the reduction of the number of falls from the 4 months before compared to the 4 months after the implementation; as well as have a better understanding of nurses' opinions of the efficacy in reducing falls, improving communication, and reducing workload.

Hypothesis

H1: the implementation of call bells and exit alarms will significantly reduce the number of falls, especially by the bed and in the bathroom, and nurses' opinions will find them efficacious in reducing falls, improving communication, and reducing workload.

Review of Literature

A literature review of available evidence was undertaken to understand current evidence surrounding the use of exit alarms and call bells (see appendix A). Several databases were used to perform a thorough search of the available evidence. Data bases that were included in the literature review include PubMed National Center for Biotechnology Information part of the U.S. National Library of Medicine was used, MEDLINE (Ovid [®]) also part of U.S. National Library of Medicine, as well as The Cumulative Index to Nursing and Health Literature (CINAHL). Literature was excluded that was published before 2014, and included only studies where full text was available. Population key terms used included: Psychiatric Hospitals, Psychiatric Involuntary Treatment, Psychiatric Rehabilitation, Hospital Psychiatric Department. Intervention key terms used included: modular bed absence sensor device, bed alarm, exit alarm, call bell. Outcome key terms used included: accidental falls, falls. Boolean term OR was placed between individual key terms, and Boolean term AND was placed between term categories. After searching all three databases 67 articles were identified. Of these articles 11 were considered duplicates, leaving 56 articles. Of those articles, further excluded articles were not related to the population, not within the time frame, were not about falls, or did not use a form of call device or exit alarm, leaving 13 articles not including grey literature. See appendix B for Prisma flow diagram.

PubMed

PubMed was used to search key terms for population with, intervention, and outcome. When searching population, intervention, and outcome together, no results were found. When searching population and outcome, 18 results were found. When searching intervention and outcome, 14 results were found.

Ovid

Ovid was used to search key terms for population, intervention, and outcome. When searching population, intervention, and outcome together, no results were found. When searching population and outcome, 3 results were found. When searching intervention and outcome, 6 results were found.

CINAHL

CINAHL was used to search key terms for population, intervention, and outcome. When searching population, intervention, and outcome together, no results were found. When searching population and outcome, 16 results were found. When searching intervention and outcome, 10 results were found.

Grey literature was reviewed from Greylit.com. Individually terms were searched. The limit of within 5 years was applied. Literature was eliminated if it was not relevant to the population, the intervention, or the outcome. Population key terms used: Psychiatric Hospitals (yielded 1 results, 0 relevant to falls), Psychiatric Involuntary Treatment (yielded 0 results), Psychiatric Rehabilitation (yielded 0 result), Hospital Psychiatric Department (yielded 1 results, 0 relevant to falls). Intervention key terms used: modular bed absence sensor device (yielded 0 results), bed alarm (yielded 0 results), exit alarm (yielded 0 results), call bell (yielded 0 results). Outcome key terms: accidental falls (yielded 2 results, 2 relevant to falls in patients), falls (yielded 32 results, 2 relevant to falls in patients). 2 of the 4 total relevant results were duplicates. See appendix B for Prisma flow diagram.

In analyzing the literature, there was consistency that inpatient psychiatric hospitals experience falls at higher rates than medical units (S Abraham, 2016) and have unique challenges related to falling. According to a qualitative study of psychiatric professionals working on a psychiatric unit, psychiatric units pose a challenge when it comes to preventing falls due to patient movement (Powell-Cope et al., 2014). One survey suggests that mental health staff feel that intrinsic factors, like unsteady gait, history of falls, and psychotropic medications can cause falls (S. Abraham, 2016a). Another survey suggested that mixing different types of patients together on the same unit with different disorders such as dementia with schizophrenia or bipolar can also increase falls, but does not specify how (Wynaden, Tohotoa, Heslop, & Al Omari, 2016). Older psychiatric patients are at a higher risk of fall, and females are at a higher risk than males of falling (Rao et al., 2018).

A review of grey literature offered contributing factors to falls in the New York City area. Relevant to this study, were polypharmacy, trip hazards, exercise, lack of balance or fall safety equipment in patients 65 and older (Marcum J, 2014). Falls are the most likely adverse event to occur on a psychiatric unit according to a study of 9,780 safety events in Veterans affairs psychiatric units (Mills, Watts, Shiner, & Hemphill, 2018). Falls are also partly due to poor communication about fall risk and poor system for fall assessment and intervention according to a root cause analysis study (Mills et al., 2018). Psychiatric diagnosis can also play a role in falls in psychiatric patients. Of patients 65 and older, patients who fell were more frequently diagnosed with mood disorders and patients who suffered dementia, those that had Alzheimer's were at greater risk of falls (Oepen et al., 2018).

Appropriate falls assessment was also necessary in falls prevention. Answers to a survey of mental health professionals suggest requiring a thorough risk assessment so that patients with risk factors can have special attention (S. Abraham, 2016b). The review of grey literature also revealed similar findings that emphasized the need for identifying fall risk patients (New York City Department of Health and Mental Hygiene, 2015). Generic falls risk assessments and management tool are not specific to the psychiatric population and available resources, and can be caused by changes in cognition, behavior, and mental states (Wynaden et al., 2016).

The literature also agrees that call bells and exit alarms are not only effective in reducing falls, but are also well received by psychiatric unit staff. Using electronic sensor bed/chair alarms significantly reduced falls in cognitively impaired individuals. In a questionnaire nursing staff found bed and chair alarms to be helpful to reach patients before they fell, but found that it was ineffective if a patient rolled off of the bed (Wong Shee, Phillips, Hill, & Dodd, 2014). Falls tool kits that include environmental features such as alarms and wandering technology that are strongly backed by lecture presentations of the material and coaching are also effective in reducing falls (Quigley, Barnett, Bulat, & Friedman, 2014). Wireless modular bed exit alarms were also found to be not only effective in accurately detecting bed abscesses, allowing for rapid staff arrival, but also proved to reduce workloads for staff (K. Subermaniam et al., 2016). Call bells are also effective in improving fall prevention. Prompt call bell responses that were less than 60 seconds helped to reduce falls per 1000 patient days (Hoke & Guarracino, 2016). Using Call bells that are in sight and reach as part of a care bundle that includes other fall prevention interventions, can significantly reduce falls (Healey et al., 2014).

Not all articles agree with the idea that exit alarms and call bells are useful to prevent falls. A study of the 6-Pack interventions were not shown to be effective in preventing falls. The 6-Pack included: emphasis on fall alert signage, patients beds in low position, gait aids within in reach, bed/Chair alarms used, needs for bathroom supervision documented, and toileting schedule documented did not show to be effective in preventing falls (Barker et al., 2016). This finding does not mean that bed and chair alarms are not effective in preventing falls as this study showed bed and chair alarms were used the least per 1000 occupied bed days compared to other interventions having less of a contribution to the falls prevention data (Barker et al., 2016).

There was very little research on the use of chair and bed alarms with call bells in psychiatric facilities. This statement does not mean that many facilities do not use them. In a study of 24 mental health professionals, half of respondents said they used bed and chair exit alarms, found the alarms useful and had a positive attitude about them for high risk falls patients in their psychiatric facility (Powell-Cope et al., 2014). This meant that there was potential that this intervention may be helpful to reduce falls, but there still lacked data to back its use. The need was clear that falls in psychiatric floors are unique to the rest of the healthcare field, and that call bells and exit alarms can prevent falls. The question was, would call bells and exit alarms be effective on a psychiatric unit in preventing falls?

Theoretical Framework and Application

The most fitting theoretical framework for this project was the Knowledge to Action (KTA) framework (Field, Booth, Ilott, & Gerrish, 2014). The KTA uses two components: the Knowledge Creation Funnel, and the Action Cycle that surrounds the Funnel (Field et al., 2014).

In this project, Knowledge Creation represents the knowledge about falls in psychiatric hospitals, call bell use, and exit alarm use that has been found, has been synthesized, and tailored to create an intervention tool to help reduce falls. Knowledge related to call bells and exit alarm were synthesized to understand their impact on reducing falls. Knowledge related to where falls occur in psychiatric hospitals, what types of patients fall, as well as fall identification processes are used to develop a clear understanding of how to best go about developing a useful fall prevention strategy using call bells and exit alarms.

As part of the action cycle, the first step of the cycle, problem identification, was reducing fall in psychiatric hospitals. The second step of the cycle, where knowledge was adapted to this population and location, call bells and exit alarms were chosen that were psychiatrically safe to use, meaning no wires or strings. The third step of the cycle, where assessment was made of barriers to knowledge use, staff hesitance to change was addressed though staff education. The fourth step of the cycle, where the interventions were selected, tailored, and implemented, the specific unit of the project was considered. Exit alarms placed so that when used, they were heard from the nurse station. Call bells were hook and loop taped within reach of both the bed was well as in the bathroom within reach between the toilet and shower. Training on how to use these products were specific to this unit and its documentation practices. This was the stage where the education and implementation of the call bells and exit alarms occurred. The fifth stage, where knowledge use was monitored, a written log detailed which if the interventions were used and if they were not, why they were not. The sixth stage, where outcomes were evaluated, a through reviewing logs and hospital falls data will help to understand the impact of fall prevention strategy with call bells and exit alarms. The seventh, and final stage before the cycle repeats is the sustained knowledge use stage. In this stage, knowledge obtained from the evaluative stage would either promote or discount the use of these fall prevention tools. At which point this information was disseminated on the unit as well as at Rutgers University, where if call bells and exit alarms were effective in reducing falls and their use became part of unit policy, and spread to other hospital system psychiatric units. (Refer to appendix C).

Methodology

The study used a quasi-experimental design with total population purposive sampling. Total population was the total population of the hospital unit fall risk patients and nurses.

Design of Project

The study was both descriptive and analytic, with a pre/post design as well as a survey and analysis of reasons why patients did not receive the intervention. The study had four phases: Introduction, Intervention, Staff Interpretation, and Data Analysis.

Phase 1: (education). During the first phase of the project, the principal investigator (PI) educated staff using handouts and a presentation on the proper use of call bells and exit alarms, including when it may not be appropriate to use them, as well as study documentation. Education was provided on the use of the 433-CMU-40 Wireless Economy Central Monitoring Unit, with information regarding the limitation of 40 maximum patients, the wireless range of 150 to 300 feet from the central monitoring system, and the fact that the monitor must be plugged in at the nurse station. Education also indicated that the Smart Caregiver Wireless Cordless chair and bed sensor with transmitter should be cleaned with chlorine sanitary wipes between each patient (personal communication, Emily Newton customer service at Smart Caregiver, April 5, 2019). A demonstration occurred during training. Staff Registered Nurses received instruction on how to teach patients how to use the call bells and exit alarm and confirmed their understanding with teach back and/or verbalization of understanding.

The staff nurses were educated on criteria to use call bells and exit alarms with patients, namely, those with a score of seven or more on the Wilson Sims fall scale whom the staff could be reasonably sure would not use the devices inappropriately or unsafely. If a patient met these criteria, the nurses were instructed to simply place the patient's information sticker and date in the paper log book. If they did not meet criteria, the nurses were to note that in the log by placing the patient's information sticker and date, then circling the reason why they were excluded (e.g., "Patient was agitated and may throw device", or "Patient unwilling to sleep in the bed", "Only

using the call bell or only using the bed alarm because:______", "Patient unwilling to use the devices", etc., or other with a fill in the blank, see Appendix D.) Dates of education were from October 21 to October 26, 2019.

Phase 2: (deployment). The hospital already collected falls data for every unit of the hospital through a log book that was kept on the unit. The hospital created a monthly report and provides aggregate data and lists of individuals, their demographics, and information on where falls occurred (going to the bathroom, in the bathroom, balance/transfer, reaching, agitation/confusion, history of falls, seizure, also alcohol, and other categories) and if they were considered a high fall risk at the time. The study collected data from this monthly report and evaluated four months prior to implementation compared to four months after the implementation, June 26, 2019 to October 26, 2019.

Based on the decision criteria noted above, patients deemed eligible received the intervention of a call bell taped via hook and loop tape to an object within reach of the patient while in bed and in the bathroom within reach between the toilet and shower, as well as a wireless bed exit alarm (see Appendix E) (Billeen, 2013). If the patient was using a wheel chair, they also received a wireless chair exit alarm. These alarms were connected wirelessly to a Central Monitoring Unit (CMU) that sounded and need to be turned off if the patient tried to get out of bed. Each nurses station had its own CMU for the patients it served. Nurses educated patients on the use of the devices and the importance of using them in situations where they need help, especially standing or transferring. Nurses confirmed their understanding with teach back and/or verbalization of understanding. Nurses then followed the previously described protocol for documenting device use. The dates of data collection were from October 27, 2019 to February 27, 2020.

Phase 3: (survey). Nurses received a questionnaire at the end of the study discussing the effectiveness of communication with patients, as well as whether they felt this was an effective way to prevent falls ("Do you feel that using call bells and exit alarms was helpful to communicate your patients' needs?" with an open-ended question of "why do you feel that way? - see Appendix F) Dates for completion of the questionnaire were from February 28, 2019 to March 5, 2020.

Phase 4: (data analysis). As described in greater detail below, the primary outcomes of interest were the number and location of falls; comparisons were made between the pre- and post-intervention phases. The number of falls that occurred for patients who did not receive call bells and exit alarms were compared to those who did receive them. Falls that were caused by seizure were excluded as seizures can happen without warning and increased communication between patient and staff would not prevent them. Additional analyses examined reasons that patients were excluded from receiving call bells and/or exit alarms and nurses' opinions regarding the utility of the intervention. The data analysis occurred between March 6, 2020 and March 12, 2020.

Setting

This project was conducted at a hospital in an urban hospital located in Jersey City, New Jersey. This hospital has two psychiatric units, one voluntary (15 beds) and one involuntary (21 beds), which were situated side by side and where patients had limited ability to cross from one side to the other. Each room housed two patients and had its own bathroom with shower. There were two rooms with medical style adjustable beds, one on the voluntary unit and one on the involuntary unit. There were also three quiet rooms on the involuntary unit and one on the

voluntary unit that were used to separate, restrain, or house patients temporarily while rooms were rearranged.

Staffing is based on ratios of patients to staff and typically ranges from four to six nurses with between two and five mental health workers and patient care technicians. This number may have been increased if there were patients who were placed on 1-to-1 observation for safety. Patient care technicians were not required to have a bachelor degree and mostly work as nurse's aides, collecting vital signs, performing close observation recording, and drawing blood. Mental health workers have a minimum of a bachelor's degree in psychology with training similar to that of a nurse's aide, but also lead group sessions and have the ability to help counsel patients. According to NJ Health's Reporting of Hospital Patient Care Staffing for this hospital's psychiatric units, in the quarter ending on December 31, 2018, Registered Professional Nurses were each assigned, on average, approximately 4.7 patients (State of New Jersey Department of Health, 2019)). Both units' nursing and support staff were under the direction of one Unit Manager, who was under direction of the Director of Psychiatric Services.

As this was a quality assurance project, the Director of Nursing and Nursing Manager required nursing staff to participate in the first three phases of the project. The Clinical Resource Manager assisted in procuring the devices needed through required medical supply companies. Hospital report data on the number of falls and related situations where falls occurred, falls risk status, and seizure causes. Data for the four months prior to and four months after the implementation of the intervention were provided by the Director of Clinical Excellence. The Director of Clinical Excellence provided data on individuals to link falls to study records on use of devices as recorded in the paper log.

Study Population

Jersey City and its surrounding cities have a diverse population. Jersey City has almost equal distribution of Hispanic, Asian, Black, and Caucasian races, where approximately 30% of the population is foreign born, mostly from Latin America and Asia (CityData.com, 2019). This diversity in population is seen in the hospital's psychiatric wards. Patients seen in the involuntary unit have been committed due to risk of harming themselves, others, or property, receiving diagnosis from a wide range of disorders, including schizophrenia, schizoaffective disorder, major depressive disorder, dementia, delirium, and bipolar disorders. Some may also be detoxifying from substances such as benzodiazepines, alcohol, stimulants, and hallucinogens like PCP and synthetic drugs. The voluntary unit sees similar diagnoses, but these patients have increased insight and have decided to participate in treatment because they felt they needed help (personal communication, Director of Nursing of urban Jersey City hospital, April 5, 2019).

Subject Recruitment

As part of a quality assurance project, subjects included patients who met fall risk criteria. Patients who were excluded were those who did not use call bells and exit alarm correctly or refused them. All patients deemed a high fall risk were included in the study, even those who did not receive the intervention, because the analysis included reasons these patients were excluded from using the devices and whether they fell. All active staff nurses were requested by nursing management to answer the short survey questions. To ensure an adequate sample size for statistical testing, the project targeted a sample size of no more than 130 high fall risk subjects to participate in the project, based on an estimated population of 140 fall risk patients, a confidence interval of 5, and a confidence level of 95%. All nurses who worked in both units, full-time, part-time, and per diem were requested to fill out the questionnaire. They could choose not to participate as it was voluntary survey, which was mentioned in the "Consent

to Take Part in Anonymous Research" that was attached to the survey. No more than 41 Staff RNs were considered subjects for the survey. Potential respondents who were excluded included those who were not nurses currently employed on the unit of study and nurse managers.

Consent Procedure

Per 45 CFR § 46.104 - Exempt Research, no written or verbal consent was required for patients to receive the intervention because the provided interventions are considered standard care in other hospitals and the goal of this project was to see if they are effective. Identifying data from patients' stickers was necessary to identify and match patients from hospital reports with the paper log. Because the stickers include the patients' medical record numbers and Account Number; the analytic file used an anonymous code for each patient after the Director of Clinical Excellence linked fall records to data in the study log. The log was destroyed after matching was completed and the anonymous codes were assigned. The de-identified data will be held for 6 years, per Rutgers policy, at which point they will be destroyed. Only aggregated demographic data were kept for analysis. The anonymous nursing survey had a sheet attached that specified that by submitting the survey they consented to be an anonymous study participant.

Risks/Harms/Ethics

Ethical concerns were related to the population and their ability to consent to receiving the intervention. Patients were psychologically impaired and/or may be held involuntarily on the unit and subject to unit rules and policies without consent. These conditions would translate into the use of the intervention. To counteract this, patients could request not to use one or all of the interventions provided to them. This was documented by nursing staff.

Subject Costs and Compensation

Subjects did not receive compensation for participating in this quality assurance project.

Outcomes to be Measured

As described previously, the primary outcomes of interest were the number and location of falls during the two four-month periods before and after implementation of the intervention. Analyses took into consideration the reasons for patient exclusions from participation, as well as if those patients who fell during the 4 months after the implementation had received call bells and exit alarms. Separate analyses examined nurses' perceptions of the use of call bells and exit alarms.

Project Timeline

Dates of education were from October 21 to October 26, 2019. The dates of data collection were from October 27, 2019 to February 27, 2020. Dates for completion of the questionnaire were from February 28, 2019 to March 5, 2020. The data analysis occurred between March 6, 2020 and March 12, 2020 (see appendix G).

Resources Needed/Economic Considerations

The cost of resources, totaling \$1511.67, was covered by the hospital (Senior Director of Nursing Practice of urban Jersey City hospital, personal communication, April 1, 2019). See Appendix H for a detailed list of study equipment and costs.

Evaluation

Data Analysis

Both ratio and nominal data were analyzed. The total number of patients deemed high fall risks, the number of falls, and the number of falls in each type of location (bathroom and bedroom as well as outside of the bathroom and bedroom) were recorded as ratio variables, before the implementation of the interventions (T_1) and after the implementation of the interventions (T_2). These were compared using ratio of falls to fall risk patients before

implementation in T₁ and after the implementation of the interventions in T₂. Survey data provided subjective opinions from nurses of their experienced during T₂ of the efficacy in reducing falls, improving communication, and reducing workload. The project hypothesis (H₁) was that the implementation of call bells and exit alarms would significantly reduce the number of falls, especially by the bed and in the bathroom, and nurses' opinions will find them efficacious in reducing falls, improving communication, and reducing workload. The reasons for eligible patients not receiving the intervention were represented as categorical (nominal) variables, which were evaluated using frequencies and percentages. The number of falls that occurred for patients who did not receive call bells and exit alarms, had a seizure as a cause of the fall, or had not received the interventions but fell was also recorded and discussed. Demographic data from hospital reports and from the log provided percentages of male and female patients, as well as average ages of those who fell and those who were considered a high fall risk. Nominal data from the survey were analyzed using frequencies and percentages. The PI examined open ended log and survey data to identify any patterns in responses.

Data Maintenance and Security

Data files were transmitted via the encrypted hospital system email system. Data held on the hospital system computer cloud system were password protected. Data held on the PI's private laptop were password protected in a specified folder. Identifying data was destroyed after matching and coding occurred. Protected health information on the log came from patient stickers and included name, age, account number, and financial numbers. During coding, subjects received a case ID. Data with case ID's will be held for 6 years as per Rutgers policy, at which point they will be destroyed. The paper log did not leave the hospital unit of study until it was destroyed at the end of the study. Deidentified data from the log will be held in a secured Rutgers approved location for 6 years by Rutgers staff Gerti E Heider, faculty advisor who can be reached at 65 Bergen street, Newark NJ 07107, 201-684-7206, heiderge@sn.rutgers.edu. Any pictures and or representations of the log included in presentations wer de-identified. Only Rutgers and institution-based project chairs, team members, and the PI will have access to data.

Results

Result of the study are divided into two parts: (1) Falls Data from the preintervention and intervention periods and (2) Nursing Survey data with objective opinions of their experience of the intervention period. Overall, falls data found a reduction of falls from preintervention to the intervention periods, but due to the low frequency of falls in the preintervention period, this study is unable to establish statistical significance when compared to the intervention period. Nursing Survey data on the whole found that nurses experienced that the use of call bells and exit alarms were efficacious in reducing falls and improved communication of patient needs. The nursing survey revealed that nurses had mixed opinions when it came to reducing workload. The Falls Data and Nursing Survey Data are presented below.

Patient Demographics

Demographic data provided percentages of male and female patients, as well as average age. There were 28 (42.2%) female and 38 (57.6%) male falls risk patients in T_1 . In T_2 , females represented 12 (38.7%) of fall risk patients and 19 (61.3%) were males. The average age of fall risk patients was 51.7 years old in T_1 and 48.6 years old in T_2 . The average age of patients who fell, excluding the fall due to a seizure, was 53 years old in T_1 and 62 years old in T_2 (see Appendix J).

Falls Data

The falls data in this section are presented as the 4 months before call bells and exit alarms were introduced to the unit of study as the pre-intervention period (T_1), and the 4 months after call bells and exit alarms were introduced to the unit as the intervention period (T_2). The total number of patients deemed high fall risks according to the Wilson Sims Falls Scale were 66 patients in the preintervention period (T_1), and 31 patients in the intervention period (T_2).

The total number of falls had reduced from the preintervention period (T_1) compared to the intervention period (T_2), although the number of falls in T_1 did not allow for conclusions that the reduction was statistically significant. There were 6 falls with no seizures occurring in the preintervention period (T_1), while there was a total of 3 falls, with 1 of these being a seizure, in the intervention period (T_2). In terms of falls occurring in the bathroom and bedroom, there were 6 in T_1 and 0 in T_2 . The number of falls outside of the bathroom and bedroom were 0 in T_1 , and 3 falls, one of which being a seizure, in T_2 .

The falls data from T_1 was compared to T_2 excluding the fall due to seizure, using ratios and percentages. These percentages from T_1 to T_2 show a reduction of the number of falls compared to the number of falls risk patients. In T_1 the ratio of falls to fall risk patients was 6 falls out of 66 fall risk patients (9%) T_1 , which dropped to 6% (2 falls out of 31 fall risk patients) in T_2 . One patient who fell in T_2 received both call bells and exit alarms, and one patient who fell did not receive them and had refused both call bells and exit alarms. The patient who received the intervention fell outside of the bedroom and bathroom, but did have an exit alarm on his wheel chair. Excluding both the patient who fell due to a seizure and the patient who did not receive either call bells or exit alarms, the adjusted ratio was 1 fall to 31 falls risk patients (3%) in T_2 . Analyses also considered the use of both types of interventions (i.e., call bells and exit alarms). Overall, 26 fall risk patients received one or both of the interventions, and 5 patients did not receive either of them. Twenty (76.9%) of the 26 patients received both call bells and exit alarms, while 4 (15.4%) only used a call bell and 2 (7.7%) only used an exit alarm. Of the 5 patients who did not receive the intervention, 3 refused to use the devices, 1 initially received them but was using them incorrectly and had them taken away, and 1 never received them because they were on 1-to-1 staff-to-patient observation, not necessitating either device.

Nursing Survey Data

Nominal data from the survey were analyzed using frequencies and percentages. Out of the 41 employed nurses, 19 nurses or 46% of the total nursing staff responded to the survey. For the first question "Do you feel that using call bells and exit alarms were helpful to communicate your patients' needs?", 14 respondents (73.7%) said yes, 5 (26.3%) said maybe, and 0 said no (see Appendix K). There were several comments to this question:

"Staff were alerted in real time when pts were out of bed/chair/bathroom", "Depends on the activity of the patient", "Patients are able to alert the staff when they need help", "For most pts it felt like annoyance to them. But for those who really needed it ->used it.", "because as an inpatient psychiatric unit, we do not have these things usually built into the unit, but our patients are at the same risk of falls as medical patients", "The exit alarms were a huge factor in decreasing falls", "yes it was helpful for when the pt got up & bed alarms let me know pt was up."

For the second question "Do you feel call bell and exit alarms helped to prevent patients from falling?", 15 respondents (78.9%) said yes, 4 (21.1%) said maybe, and 0 said no (see Appendix K). Verbatim comments included the following:

"Staff can be at the patients side faster and reduce standing time", "alerts staff when patients get up even when they didn't informs with the call bell", "For those who needed it -> yes", "they alerted staff to patient that would get out of bed so staff could potentially anticipate any safety issue(s) that may arise", "delayed alarm response."

For the third question "Do you feel exit alarms or call bells, both, or neither are more effective in preventing falls?", 2 respondents (10.5%) said call bells, 2 respondents (10.5%) said exit alarms, 14 respondents (73.7%) said both call bells and exit alarms, and 1 respondent (5.3%) said neither call bells or exit alarms (see Appendix K). Verbatim comments included:

"It depends on the patient's needs, but call bells + exit alarms together are best for patient safety", "I feel like many of our patients may not have the cognitive or insight to use a call bell when needed", "able to hear exit alarms at nurse station", "Yes I think it was effective tool to prevent falls."

For the fourth question "Do you feel that using call bells and exit alarms has reduced your work load?", 5 respondents (26.3%) said yes, 7 respondents (36.8%) said no, and 7 respondents (36.8%) said maybe (see Appendix K). Verbatim comments included:

"Tones go off every time the pt gets up from censored pad. So it may increase workload because it requires constant resetting of the alarm, however if a fall did occur without the alarm that may require more work to attend RCA meeting", "Bells + alarms not used properly. Should only be used for the right patient who really need them", "It has increased the workload when the sensor/exit alarms are shifting or placed wrongly it alarms frequently even when the pt is just shifting. But on a positive note it forces frequent rounding.", "More items to chart. Exit alarms can provide false alerts", "patients require the same level of monitoring", "decrease in falls decrease paperwork", "In some ways yes, in that knowing the bed alarm was there it helped me concentrate more on the other pt's needs."

Discussion of Findings

The study finds results consistent with research on the of use call bells and exit alarms in medical settings. Findings are based on qualitative data. Due to, the low frequency of falls in the preintervention period, the study was unable to determine statistical significance. This study combined currently used fall safety measure and electronic medical record system with implementing call bells and exit alarms. It therefore supports the evidence from the randomized trial by Dykes in 2010 that found that number of falls can further be reduced significantly when chair and bed exit alarms are combined with other fall prevention techniques and implemented with reminders in electronic medical record technology. This study also supports the study by Subermaniam et al in 2017 were exit alarms significantly reduced falls, but may not support the conclusion that it reduced workload scores for nurses. This study also supports the results of Hoke and Guarracino (2016) that found that call bells have a higher chance of decreasing falls when responded to within 60 seconds.

Limitations

As mentioned previously there are several limitations to this study. Considering these limitations, the data found in this study do not have the predictive value needed to determine significance but do support future study of these tools on psychiatric units. This study was limited in time and, as a result, participants. This study did not have enough falls in the preintervention period to be able to determine a significant result in the intervention period. **Implications**

There are several potential benefits of this study. The implementation was successful and nurses were able to provide exit alarms and call bells effectively. Falls is a national quality indicator, and even though the results are not significant, falls did reduce in those considered fall risks who received the intervention, reducing from 9% to 3% which is a 2/3 reduction, potentially improving quality of care (U.S. Department of Health & Human Services, 2019). The majority of nurses, 73.7%, agree that using call bells and exit alarms was helpful to communicate their patients' needs. The majority of nurses, 78.9%, agree that call bell and exit alarms helped to prevent patients from falling. The majority of nurses, 73.7% agree that both exit alarms and call bells more effective in preventing falls, than either one intervention individually. Nurses were almost evenly split on if they felt that using call bells and exit alarms had reduced work load. That being said, the majority of nurses felt that the combination of call bells and exit alarms were effective in increasing communication and preventing falls, but that this intervention may increase workload unlike previous studies that suggest otherwise, although the results were mixed. Positive comments suggest that the interventions helped to alert staff in "real time" that patients were getting out of bed or needed something, anticipating needs, and helping staff to be at the patient's side faster reducing standing time. One person said the intervention was "a huge factor reducing falls". One person said that it reduced work load especially if a patient fell, because nurses who have a patient fall need to go to a meeting with management on their day off. Negative comments suggest that results could vary depending on the activity of the patient, that patients thought of it as an annoyance, and that the alarms had delayed response time. One person said that they felt patients may not have the cognitive ability to use call bells. These are all issues that should be further researched in the future.

This implementation project concludes that the interventions of call bells and exit alarms in patients who are high fall risk may be effective tools, are accepted by nurses, and that there is evidence to further study them. The unit has decided to continue their use, but further expanded testing is necessary to substantiate significant results of the falls reduction. These findings not only encouraged the continuation of their use but also, after further testing, could spread their use throughout the hospital system. This has the potential to save money on costly falls and reductions in reimbursement, which should also be studied in the future.

Sustainability and Translation

This quality assurance project found that the use of call bells and exit alarms could potentially be useful and accepted by nursing staff, and have several factors that would help to promote sustainability of their use. After the project, the unit already has the supplies and training necessary to continue its use after the project was finished. Continued use was also bolstered through change of unit policy through the unit director's unilateral decision.

Plans for Dissemination and Professional Reporting

The study results were disseminated to the rest of the hospital network's psychiatric units via presentation at the Psychiatric Subcommittee meeting and Falls Committee. Here, other units and hospital system representatives learn of the benefits of using call bells and exit alarms to prevent falls in psychiatric units and how to implement them. Despite needing further study, this project provided evidence to support locations that currently use them, and evidence to implement their use on units that have not already done so. This project was also presented at Rutgers University before April 2020 and a research presentation board will be displayed during the hospital's Nursing Research Board Presentation during Nurses Week in May 2020.

Summary

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Fall prevention has been a goal for many years and has been studied in many ways, and millions have been spent in research to develop techniques. Despite the attention the issue has received and the increase in evidence-based interventions, falls continue be a common and devastating complication of inpatient care, representing significant costs to hospitals and risk to patients. Call devices like call bells and exit alarms have been studied extensively in medically hospitalized patients, but there was relatively little research into their use with high risk fall patients in inpatient psychiatric units. In practice, many inpatient psychiatric institutions borrow these strategies from the medical field despite minimal direct evidence to support their use in psychiatric care.

This project sought to determine if implanting call bells and exit alarms on the unit of study with psychiatric patients that were considered fall risks, identified by the Wilson-Sims Fall Risk Assessment Tool, would be effective in reducing falls compared to current practice within 4 months, and better understand the perceptions of nurses in regards to change in work load as well as communication of patient needs. This project implemented on the psychiatric unit of study, call bells and exit alarms, tools that were widely used in medical units to help to reduce falls. Nurses logged who received them and who met criteria but did not receive them. Hospital data on how many and where falls occur as well as aggregated demographic data was collected. At the end of the study nursing staff received a questionnaire on opinions of the effectiveness of using the interventions, if they improve communication, and how they affected work load. The number of and location of falls during the four months periods before and after implementation of the intervention was compared using frequencies and percentages. Data regarding the reasons eligible patients had not received the intervention was also analyzed using frequencies and percentages.

This study examined the open-ended log responses and survey data to identify any patterns in responses.

The project aimed to implement call bells and exit alarms in an attempt to reduce falls and improve communication with patients in a psychiatric unit. The objective was to reduce the number of falls with the implementation of call bells and exit alarms with the reduction of the number of falls from the 4 months before compared to the 4 months after the implementation; as well as a better understanding of nurses opinions of the efficacy in reducing falls, improving communication, and reducing workload.

The results of the study show that falls were reduced in the 4 months after the implementation compared to the 4 months before, but that this reduction cannot be considered statistically significant due to the number of falls in the preintervention period, requiring further study. The results of the nursing survey indicate that the majority of nurses agree that using call bells and exit alarms was helpful to communicate their patients' needs, and that call bell and exit alarms helped to prevent patients from falling. The majority of nurses also agree that both exit alarms and call bells more effective in preventing falls, than either one intervention individually. Nurses were almost evenly split on if they felt that using call bells and exit alarms had reduced work load.

The results of this study emphasize the need for continued study into the effectiveness of call bells and exit alarms for falls reduction. The study demonstrates that a larger sample size over a longer period of time could lead to results that would prove statistically significant and deserve to be studied further. Future studies should also look at the e/ffects of call bells and exit alarms on the financial impact on hospitals as well as the physical consequences such as injuries,

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need for tests and procedures etc. for patients. Call bells and exit alarms have shown in this study that they deserve further investigation.

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Appendix A

Table of Evidence

EBP Question: "Does the use of call bells and exit alarms with identifiable fall risk psychiatric

patients help communicate to staff patients' needs, and will help to prevent falls.?"

P (population) = identifiable fall risk psychiatric patients

I (intervention)= call bells and exit alarms

- C (comparison)= compared to current practices of not using call bells and exit alarms
- O (outcome)= communicate to staff patients' needs, and help to prevent falls

T (time)= 6 month period

Author & Date	Evidence	Sample,	Study findings	Limitations	Evidence
	Туре	Sample Size,	that help		Level &
		Setting	answer the		Quality
			EBP Question		
Authors:	Randomized	Sample:	Findings: The	-Bed and	Level: I
Barker, A. L.	Control Trial	All patients	6-Pack	Chair alarms	Quality:
Morello, R. T.		admitted to 24	interventions	were used the	
Wolfe, R.		acute wards	(Fall risk tool	least per 1000	
Brand, C. A.		during the trial	with fall alert	occupied bed	
Haines, T. P.		period.	sign, low bed,	days	
Hill, K. D.		Sample size:	gait aid in	compared to	
Brauer, S. G.		46,245	reach,		

Botti, M.	Setting:	Bed/Chair	other	
Cumming, R. G.		alarms, need	interventions	
Livingston, P.M.		for bathroom	limiting their	
Sherrington, C.		supervision	contribution	
Zavarsek, S.		documented,	to the results	
Lindley, R. I.		toileting	-convenience	
Kamar, J.		schedule	sample may	
		documented)	not be	
Date: 2016		did not show to	representative	
Citation:		be effective in	of all	
Barker, A. L.,		preventing	hospitals	
Morello, R. T.,		falls		
Wolfe, R.,				
Brand, C. A.,				
Haines, T. P.,				
Hill, K. D.,				
Kamar, J.				
(2016). 6-PACK				
programme to				
decrease fall				
injuries in acute				
hospitals: cluster				
randomised				

nitations:	Level: III
onvenience	Quality:
nple may	Good
t be	
presentative	
all	
spitals	
	nitations: nvenience ple may be resentative all pitals

Stewart, J.,			risk falls		
Melillo, C.,			patients in their		
Friedman, Y.			psychiatric		
(2014). A			facility		
qualitative					
understanding of					
patient falls in					
inpatient mental					
health units. J					
Am Psychiatr					
Nurses Assoc,					
20(5), 328-339.					
doi:10.1177/107					
8390314553269					
Authors:	Qualitative	Sample: Safety	Findings:	Limitations:	Level:III
Mills, P. D.		Reports			Quality:
Watts, B. V.		Sample size:	-Falls were the	-safety reports	good
Shiner, B.		9,780	most frequent	may not	
Hemphill, R. R.		Setting:	adverse event	represent all	
		Veterans	in VA	adverse	
Date: 2018		Health	psychiatric	events	
Citation:		Administration	units.	-mostly male	
		(VHA)		patients might	
	1	1	1		

Mills, P. D.,		mental health	-Poor	not take into	
Watts, B. V.,		units	communication	account	
Shiner, B., &			about fall risk	females.	
Hemphill, R. R.			and Poor		
(2018). Adverse			system for fall		
events occurring			assessment and		
on mental health			intervention		
units. Gen Hosp			were found in		
Psychiatry, 50,			root cause		
63-68.			analysis		
doi:10.1016/j.ge					
nhosppsych.201					
7.09.001					
Authors:	Quasi	Sample:	Findings:	Limitations:	Level: II
Hoke, L. M.	Experimental	cardiac			Quality:
Guarracino, D.		intermediate	-The falls data	-data is based	Good
		care unit	showed that	on changes in	
Date: 2016		(CICU)	the majority of	falls numbers	
Citation: Hoke,		patients	falls occurred	but without a	
L. M., &			when patients	total sample	
Guarracino, D.		Sample size:	were	size	
(2016). Beyond		not specified	unassisted by	-no way to	
Socks, Signs,			nurses or other	distinguish	
Socks, Signs,			nurses or other	distinguish	

and Alarms: A		Setting:	staff members,	between	
Reflective		cardiac	most often	interventions	
Accountability		intermediate	during toileting	what	
Model for Fall		care unit	-Prompt call	contributed	
Prevention. Am J		(CICU) at the	bell response	most to the	
Nurs, 116(1), 42-			(less than 60	outcomes	
47.			seconds)		
doi:10.1097/01.n			helped to		
aj.0000476167.4			reduce falls per		
3671.00			1000 patient		
			days		
Authors:	Grey	Sample:	Findings:	Limitations:	Level: IV
Marcum J,	literature	Patients 65	-Falls are the	-based off of	Quality:
Caffarelli A, Seil		years and older	leading cause	one city	High
К.		living in New	of injuries	results and	Quality
		York City	among older	may not be	
Date: 2014		Sample size:	adults in NYC	generalizable	
Citation:		Setting: New	causing 291	-limited detail	
Marcum J, C. A.,		York City	deaths in 2011	in to how data	
Seil K. (2014).			-falls were 1.4	was collected	
NYC Vital			times higher in		
Signs: Falls			women than in		
among Older			men		

Adults in New			-contributing		
York City. New			factors were		
York City			polypharmacy,		
Department of			trip hazards,		
Health and			exercise, lack		
Mental Hygiene,			of balance/fall		
<i>13</i> (1), 1-4.			safety		
			equipment		
Authors:	Quasi	Sample:	Findings:	Limitations:	Level: II
Oepen, D.,	experimental	Psychiatric			Quality:
Fleiner, T.		patients	- patients who	-convenience	Good
Oliva, Y.		over the age of	fell once were	sample may	
Hausmann A					
		65	more	not be	
Zank, S.		65 Sample size:	more frequently	not be representative	
Zank, S. Zijlstra, W.		65 Sample size: 853	more frequently diagnosed with	not be representative of all	
Zank, S. Zijlstra, W. Haeussermann,		65 Sample size: 853 Setting:	more frequently diagnosed with mood disorders	not be representative of all hospitals	
Zank, S. Zijlstra, W. Haeussermann, P.		65 Sample size: 853 Setting:	more frequently diagnosed with mood disorders -of patients	not be representative of all hospitals	
Zank, S. Zijlstra, W. Haeussermann, P.		65 Sample size: 853 Setting:	more frequently diagnosed with mood disorders -of patients who suffered	not be representative of all hospitals	
Zank, S. Zijlstra, W. Haeussermann, P. Date:2018		65 Sample size: 853 Setting:	more frequently diagnosed with mood disorders -of patients who suffered dementia,	not be representative of all hospitals	
Zank, S. Zijlstra, W. Haeussermann, P. Date:2018		65 Sample size: 853 Setting:	more frequently diagnosed with mood disorders -of patients who suffered dementia, those that had	not be representative of all hospitals	
Zank, S. Zijlstra, W. Haeussermann, P. Date:2018 Citation:		65 Sample size: 853 Setting:	more frequently diagnosed with mood disorders -of patients who suffered dementia, those that had Alzheimer's	not be representative of all hospitals	

Oepen, D.,		The	were at greater		
Fleiner, T.,		inpatient sector	risk of falls		
Oliva, Y. H. A.,		of the	-no correlation		
Zank, S.,		department	was found		
Zijlstra, W., &		includes four	between the		
Haeussermann,		specialized	patients' cognit		
P. (2018). Falls		wards, each	ive impairment		
in hospitalized		with twenty	and the		
geriatric		beds.	medical fall		
psychiatry			consequences		
patients: high					
incidence, but					
only a few					
fractures. Int					
Psychogeriatr,					
<i>30</i> (1), 161-165.					
doi:10.1017/s10					
4161021700183					
1					
Authors:	Randomized	Sample:	Findings:	Limitations:	Level: I
Healey, F.	Control Trial	Patients			Quality:
Lowe, D.		admitted to 9	-using a care	-self reported	High
Darowski, A.		inpatient units	bundle that	measures may	quality

Windsor, J.	where 3 of	includes Call	not be
Treml, J.	which were	bell in sight	accurate
Byrne, L.	psychiatric	and reach,	
Husk, J.	units	cognitive	
Phipps, J.	Sample size:	screening,	
	Setting:	asking about	
Date: 2014	inpatient	fear of falling,	
Citation:	hospital	history of falls,	
Healey, F.,		lying and	
Lowe, D.,		standing BP,	
Darowski, A.,		medication	
Windsor, J.,		review, safe	
Treml, J., Byrne,		footwear, and	
L., Phipps, J.		urine bacterial	
(2014). Falls		test completed,	
prevention in		helped to	
hospitals and		significantly	
mental health		reduce falls	
units: an		compared to	
extended		controls	
evaluation of the			
FallSafe quality			
improvement			

project. Age					
Ageing, 43(4),					
484-491.					
doi:10.1093/agei					
ng/aft190					
Authors:	Quantitative/	Sample:	Findings:	Limitations:	Level:
Wong Shee, A.	qualitative	cognitively	-the use of	-convenience	Level I &
Phillips, B.		impaired	electronic	sample may	II
Hill, K.		geriatric	sensor	not be	Quality:
Dodd, K.		patients (fall	bed/chair	representative	High
		rates)/RN staff	alarm	of all	
Date: 2014		(opinion	significantly	hospitals	
Citation:		survey)	reduced falls in	-self reported	
Wong Shee, A.,			cognitively	measures may	
Phillips, B., Hill,		Sample size:	impaired	not be	
K., & Dodd, K.		32 (patients) 9	individuals.	accurate	
(2014).		(RN staff)	- nursing staff		
Feasibility,		Setting:	found it to be		
acceptability,		23-bed	helpful to		
and effectiveness		geriatric	reach patients		
of an electronic		evaluation and	before they		
sensor bed/chair			fell, but was		
Dodd, K. Date: 2014 Citation: Wong Shee, A., Phillips, B., Hill, K., & Dodd, K. (2014). Feasibility, acceptability, and effectiveness of an electronic sensor bed/chair		patients (fall rates)/RN staff (opinion survey) Sample size: 32 (patients) 9 (RN staff) Setting: 23-bed geriatric evaluation and	 bed/chair alarm significantly reduced falls in cognitively impaired individuals. nursing staff found it to be helpful to reach patients before they fell, but was 	representative of all hospitals -self reported measures may not be accurate	нıgn

alarm in		management	ineffective if a		
reducing falls in		subacute ward	patient rolled		
patients with		in a large	off of the bed.		
cognitive		regional			
impairment in a		health service			
subacute ward. J		in Australia			
Nurs Care Qual,					
29(3), 253-262.					
doi:10.1097/ncq.					
0000000000000					
054					
Authors:	Qualitative	Sample:	Findings:	Limitations:	Level: II
Abraham, S.		Psychiatric	-(Part 1	-survey	Quality:
Date: 2016		Mental health	discusses the	opinion not	Good
Citation:		professionals	data) Answers	based number	
Abraham, S.		working at	to the survey	of actual falls	
(2016).		psychiatric	suggest		
Managing		facilities	intrinsic		
Patient Falls in		Sample size:	factors, like		
Psychiatric		66	unsteady gait,		
Inpatient Units:		Setting:	history of falls,		
Part 1. Health		psychiatric	and		
Care Manag		facilities	psychotropic		

(Frederick),			medications		
35(1), 21-27.			and cause		
doi:10.1097/hcm			falls, and did		
.00000000000000			not think that		
094			cognitive		
:			impairment,		
			being		
			ambulatory, or		
			being agitated		
			increased the		
			likeliness of		
			falls		
Authors:	Qualitative	Psychiatric	Findings:	Limitations:	Level: II
Abraham, S.		Mental health	-(Part 2	-survey	Quality:
Date: 2016		professionals	discusses the	opinion not	Good
Citation:		working at	results)	based number	
Abraham, S.		psychiatric	Answers to the	of actual falls	
(2016).		facilities	survey suggest		
Managing		Sample size:	intrinsic		
Patient Falls in		66	factors, like		
Psychiatric			unsteady gait,		
Inpatient Units:			history of falls,		
		1	1	1	

Part 2. <i>Health</i>			and		
Care Manag			psychotropic		
(Frederick),			medications		
35(2), 121-133.			and cause falls		
doi:10.1097/hcm			and requiring a		
.00000000000000			thorough risk		
104			assessment so		
			that patients		
			with these risk		
			factors can		
			have special		
			attention		
Authors:	Systematic	Sample:	Findings:	Limitations:	Level:
Rao, W. W.	Review with	Chinese			Quality:
Zong, Q. Q.	meta-analysis	psychiatric	-older	-self reported	
Lok, G. K. I.		patients	psychiatric	measures may	
Wang, S. B.		Sample size:	patients are at	not be	
An, F. R.		204,234	a higher risk of	accurate	
Ungvari, G. S.		Setting:	fall	-Important	
Ng, C. H.		inpatient	-females are at	factors	
Xiang, Y. T.		psychiatric	a higher risk	associated	

	hospitals in	than males of	with falls such
Date: 2018	China	falling	as
Citation:			psychotropic
Rao, W. W.,			medications
Zong, Q. Q.,			and specific
Lok, G. K. I.,			psychiatric
Wang, S. B., An,			diagnosis was
F. R., Ungvari,			not examined
G. S., Xiang,			
Y. T. (2018).			
Prevalence of			
falls in adult and			
older adult			
psychiatric			
patients in			
China: A			
systematic			
review and			
comprehensive			
meta-analysis of			
observational			
studies.			
Psychiatry Res,			

266, 18-25.					
doi:10.1016/j.ps					
ychres.2018.05.0					
16					
Authors:	Grey	Sample:	Findings:	Limitations:	Level: IV
New York City	literature	Patients 65	-identifying	-this is non	Quality:
Department of		years and older	fall risks are	experimental	High
Health and		living in New	important in	literature	Quality
Mental Hygiene,		York City	preventing	based on an	
Date: 2015		Sample size:	falls	aggregate of	
Citation:		Setting: New	-exercise,	available	
New York City		York City	home hazard	information	
Department of			correction,		
Health and			medication		
Mental Hygiene.			modification,		
(2015).			Vitamin D,		
Preventing Falls			assistive		
Older Adults.			devices, and		
City Health			referrals to		
Information,			specialists may		
<i>34</i> (5), 46-53.			be necessary to		
			prevent falls		
1	1				

Level: III
Quality:
Good
-

from the general		risks	
older adult		throughout the	
population.		day.	
Collegian, 23(1),		-specific	
97-102.		causes of falls	
		can be related	
		to changes in	
		cognition,	
		behavior, and	
		mental states.	
		-mixing	
		different types	
		of patients with	
		different	
		disorders such	
		as dementia	
		with	
		schizophrenia	
		or bipolar.	
		-Falls increase	
		due to	
		medications,	
		improper foot	
	1		

			wear and		
			incorect use of		
			mobility aids		
Authors:	Quantitative	Sample:	Findings:	Limitations:	Level:
Quigley, P. A.		Psychiatric	-prevention	-not clearly	Quality:
Barnett, S. D.		inpatient	program	written	
Bulat, T.		veterans (falls	implemented	-unspecified	
Friedman, Y.		numbers)	with expert	number of	
		Sample size:	faculty	participants.	
Date: 2014		Setting:	providing	-self reported	
Citation:		Five Veteran	lectures and	measures may	
Quigley, P. A.,		Affairs	coaching a tool	not be	
Barnett, S. D.,		Hospitals in	kit that	accurate	
Bulat, T., &		similar	includes		
Friedman, Y.		metropolitan	environmental		
(2014).		cities	safety features		
Reducing falls			such		
and fall-related			wandering		
injuries in			technology and		
mental health: a			equipment		
1-year			alarms, as well		
multihospital			as hip		

falls			protectors and		
collaborative. J			floor mats		
Nurs Care Qual,			reduced falls.		
<i>29</i> (1), 51-59.					
Authors:	Quasi-	Sample:	Findings:	Limitations:	Level: II
Subermaniam,	experimental	Patients aged	-the M-BAS		& III
К.		equal to or	wireless	-length of	Quality:
Welfred, R.	Convenience	over 65 years	modular bed	study makes	High
Subramanian, P.	Sample	who mobilize	exit alarm	fall outcomes	
Chinna, K.		with or without	accurately	statistically	
Ibrahim, F.		walking aids	detected bed	insignificant	
Mohktar, M. S.		and physical	absences with	-survey	
Tan, M. P.		assistance (exit	a nuisance rate	opinion not	
		alarm	of 31%	based number	
Date: 2016		effectiveness)	-NASA-TLX	of actual falls	
Citation:		Nurses	workload score		
Subermaniam,		(workload	for nurses was		
K., Welfred, R.,		score)	significantly		
Subramanian, P.,		Sample size:	reduced		
Chinna, K.,		47 patients	-in post survey		
Ibrahim, F.,		(exit alarm	nurses found it		
Mohktar, M. S.,		effectiveness)	useful for falls,		
& Tan, M. P.			user friendly		
	1	1	1	1	1

(2016). The	30 nurses	and would use	
Effectiveness of	(workload	it in the future	
a Wireless	score)		
Modular Bed	Setting:		
Absence Sensor	acute geriatric		
Device for Fall	ward at a		
Prevention	large teaching		
among Older	hospital		
Inpatients. Front			
Public Health, 4,			
292.			
doi:10.3389/fpub			
h.2016.00292			
1			

Appendix B

Prisma Flow Diagram



PRISMA 2009 Flow Diagram



Figure 1. Prisma Flow Diagram (Moher D, 2009)

Appendix C

Theoretical Model



Figure 2. Knowledge to Action (Field et al., 2014)

Appendix D

Example Patient Log Book Page

Instructions: If patient meets criteria of 7 or higher on the Wilson Sims just place the patient's information sticker and date. If the they have a 7 or higher but are not given call bell and/or exit alarm circle one and fill in the black if necessary.

Sticker	Date	If meets criteria but not given call bell and/or exit alarm
"WRN MRN MRN	4/7/19	 a. Patient was agitated and may throw device b. patient unwilling to sleep in the bed c. Patient unwilling to use the devices d. Only using the call bell or only using the bed alarm because: e. other with a fill in the blank
"Water Market Ma	4/7/19	 a. Patient was agitated and may throw device b. patient unwilling to sleep in the bed c. Patient unwilling to use the devices d. Only using the call bell or only using the bed alarm because: Patient was unwilling to bed alarm because it annoyed him e. other with a fill in the blank f.
"Example" Age Acount number MRN	4/7/19	 a. Patient was agitated and may throw device b. patient unwilling to sleep in the bed c. Patient unwilling to use the devices d. Only using the call bell or only using the bed alarm because:

Appendix E

Wilson Sims Fall Scale

Age:

0 = 18-59 years 1 = 60-70 years 2 = 71 or more years Gender:

0 = Male

1 = Female

Mental Status:

0 =Oriented and Cooperative

1 = Oriented and Uncooperative

2 = Confused, Memory Loss, Forgets Limitations, Intoxicated

Physical Status:

0 = Healthy

1 = Generalized Muscle Weakness

2 = Dizzy, vertigo, syncope, orthostatic hypotension

3 =Cachexia and Wasting

Elimination:

0 = Independent and Continent

1 = Catheter, Ostomy

2. = Elimination with Assistance, Diarrhea or Incontinence

3 = Independent and Incontinent, Urgency, or Frequency

Impairments:

0 = None

1 = Uncorrected visual, hearing, language, speech 2 = Limb amputation 3 = Neurological paralysis, paresthesia Gait or Balance: 0 = Able to walk/stand unassisted or fully ambulatory. 1 = Physically unable to walk/stand (but may attempt) 2 = Walks with cane 3 = Unsteady walking, standing, walker, crutches, furniture History of falls in past 6 months: 0 =No History 1 =Near falls or fear of falling 2 = Has fallen 1-2 times 3 = Multiple falls, more than 2 times Mood Stabilizer Medications: 0 = Not taking prior to admission 1 = Taking prior to admission2 = Newly ordered Benzodiazepines: 0 = Not taking prior to admission 1 = Taking prior to admission 2 = Newly ordered

Diuretics:

0 =Not taking prior to admission

- 1 = Taking prior to admission
- 2 = Newly ordered

Narcotics:

- 0 =Not taking prior to admission
- 1 = Taking prior to admission
- 2 = Newly ordered

Atypical Anti Psychotics:

- 0 =Not taking prior to admission
- 1 = Taking prior to admission
- 2 = Newly ordered

Detox Protocol

- 0 = Not on Detox Protocol
- 7 = On Detox Protocol

Total = _____

Low fall risk if score ≤ 6

High fall risk if score ≥ 7

(Billeen, 2013)

Appendix F

Nursing Staff Survey

Rutgers

Rutgers School of Nursing Stanley S. Bergen Building Rutgers, The State University of New Jersey 65 Bergen Street Newark, NJ 07101-1709

CONSENT TO TAKE PART IN ANONYMOUS RESEARCH

TITLE OF STUDY: The Implementation of Call Bells and Exit Alarms on a Psychiatric Unit Principal Investigator: Morgan Bardall BA, BSN, RN, DNP candidate

This consent form is part of an informed consent process for a quality improvement/ quality assurance project and it will provide information that will help you decide whether you want to take part in this study. It is your choice to take part or not. Your alternative to taking part in the research is not to take part in it.

You are invited to take part in a research study that is being conducted by **Morgan Bardall**, who is a Doctorate of Nursing Practice student in the School of Nursing at Rutgers University. The purpose of the project is to see if implanting call bells and exit alarms would be effective in reducing falls compared to current practice in psychiatric patients who are considered fall risks identified by the Wilson-Sims Fall Risk Assessment Tool, and if this would help to reduce nursing work load as well as help communicate patient needs.

Morgan Bardall may be reached at:

We anticipate approximately 15 subjects will take part in the research. You will be asked to fill out a survey questionnaire where you will circle what you think is the best answer related to your opinion and fill in the blank with why you chose that answer. You will then place the survey in the box that is labeled Call Bell/Bed alarm survey on the unit. The information will be anonymously collected. No one will know which responses are yours. Your participation in the study will be about 5 minutes.

We do not foresee risks to subjects participating in this study.

The benefits of taking part in this study may be helping to improve the safety of patients, where your comments can help direct future use of these fall reduction items. However, it is possible that you may receive no direct benefit from taking part in this study. You will not be paid to take part in this study.

The research is anonymous. No information will be collected that can identify who you are. Additionally, to keep the data safe data will be stored in locked containers at Rutgers University under the care of Gerti Heider PhD, APRN, ANP, GNP-BC. Study data will be kept for 3 years and then destroyed.

After the study is over the information may be used by or distributed to investigators for other research without obtaining additional permission from you.

The research team and the Institutional Review Board at Rutgers University are the only parties that may see the data, except as may be required by law. If the findings of this research are professionally presented or published, only group results will be stated.



Rutgers School of Nursing Stanley S. Bergen Building Rutgers, The State University of New Jersey 65 Bergen Street Newark, NJ 07101-1709

It is your choice whether you take part in the research. You may choose to take part, not to take part or you may change your mind and withdraw from the study at any time. If you do not want to enter the study or decide to stop taking part, your relationship with the study staff will not change, and you may do so without penalty and without loss of benefits to which you are otherwise entitled. Please note, however, that once you have submitted your responses, you may no longer withdraw them as we will not know which ones are yours.

If you have questions about taking part in this study, you may contact me, Morgan Bardall,	
. You may also	
contact my faculty advisor Dr. Gerti Heider at	

If you have questions about your rights as a research subject, you can call the IRB Director at: Newark HealthSci (973)-972-3608; or the Rutgers Human Subjects Protection Program at (973) 972-1149.

We will provide you a copy of this consent form for your records.

By beginning this research, I acknowledge that I am 18 years of age or older and have read and understand the information. I agree to take part in the research, with the knowledge that I am free to withdraw my participation in the research without penalty. I know by submitting the survey that I agree to participation in this project. Do you feel that using call bells and exit alarms was helpful to communicate your patients' needs?

A. Yes B. No C. Maybe

why do you feel that way?

Do you feel call bell and exit alarms helped to prevent patients from falling?

(Circle one)

A. Yes B. No C. Maybe

why do you feel that way?

Do you feel exit alarms or call bells, both, or neither are more effective in preventing falls?

(Circle one)

A. Call Bells B. Exit alarms C. Both Call Bells and Exit alarms D. Neither Call Bells or Exit alarms

why do you feel that way?

Do you feel that using call bells and exit alarms has reduced your work load?

(Circle one)

A. Yes B. No C. Maybe

why do you feel that way?

Appendix G

Project Timeline


Appendix H

Resources Needed/Budget

Expenses	Cost	Total Cost
Roll of hook and loop tape to back call bells	1 role at \$1.90	\$1.90
20 metal call bells	20 at \$3.59 each	\$71.80
10 Smart Caregiver Wireless Bed Alarm		
and transmitter	10 at \$62.91 each	\$629.10
10 Smart Caregiver Wireless Chair Alarm		
and transmitter	10 at \$60.23 each	\$602.30
433-CMU-40 Wireless Economy Central		
Monitoring Unit (up to 40 patients)	2 unit at \$88.73 each	\$177.46
AC adaptor for 433-CMU-40	2 cord at \$9.31 each	\$18.62
binder for the printed paper log	1 binder at \$10.49	\$10.49
Total Budget		\$1511.67

Appendix I

Letter of Cooperation

Date: 04/01/2019

Re: Letter of Cooperation For:

Dear Morgan Bardall,

This letter confirms that I, as an authorized representative of allow *Morgan Bardall*, the PI, access to conduct study related activities at the listed site(s), as discussed with the PI and briefly outlined below, and which may commence when the PI provides evidence of IRB approval for the proposed project.

- Research Site(s):
- Study Purpose: To determine if the use of call bells and exit alarms with identifiable fall risk patients will help communicate to staff patients' needs, will help to prevent falls, and improve RN staff workloads.
- Study Activities: Activities include a brief introduction to educate staff on proper use of call bells and exit alarms, when it may not be appropriate to use them, as well as study documentation in the form of handouts and presentation. Falls numbers collected prior to the intervention of using call bells and exit alarms, and after the intervention of using call bells and exit alarms. RN staff will also be asked to perform a brief survey of the effectiveness of the intervention.
- Subject Enrollment: Patients who are considered a high fall risk according to the Wilson Sims fall risk scale. Excluding patients who are deemed violent by staff and would possibly use these tools inappropriately. (RN Staff will write a log of those who met the criteria if they received the intervention. If they did not receive the intervention, they will briefly explain why they did not.)
- Site(s) Support: will provide the falls data for the four months prior to and four months after the implementation of call bells and exit alarms including what types of falls occurred (going to the bathroom, in the bathroom, balance/transfer, reaching, agitation/confusion, history of falls, seizure, also alcohol, and other categories). RN staff will be educated on when to use call bells and exit alarms as well as what to do if they do not meet criteria (If they meet criteria, the RN write in the paper log book only the patient's initials and date, and if they do not meet criteria, they will write in the log by writing the patient initials and date then circle answers for reason why they were excluded like "Patient was agitated and may throw device", or "Patient unwilling to sleep in the bed", etc., or other with a fill in the blank). RN staff will receive a questionnaire at the end of the study discussing the effectiveness of communication with patients as well as if they felt this was an effective way to prevent falls ("do you feel call bell and exit alarms helped to prevent patients from falling?", "Do you feel exit alarms or call bells, both, or neither are more effective in preventing falls?", and an open-ended question of "why do you feel that way?")
- Data Management: Data will be passed through the encrypted email system. Data held on the PI's private laptop will be password protected in a specified folder. The paper log will not leave the unit, pictures and or representations of the log for presentation will be de-identified.
- Anticipated Dates: Anticipated dates of education would be the beginning of August 2019. Anticipated dates of data collection would be from late August 2019 through late December 2019. Anticipated dates for completion of the questionnaire will be in January 2020. The data analysis will be complete by February 2020 and presented prior to April 2020.

We understand that this site's participation will only take place during the study's active IRB approval period. All study related activities must cease if IRB approval expires or is suspended. I understand that any activities involving Personal Private Information or Protected Health Information may require compliance with HIPAA Laws and Rutgers Policy.

Our organization agrees to the terms and conditions stated above. If we have any concerns related to this project, we will contact the PI. For concerns regarding IRB policy or human subject welfare, we may also contact the Rutgers IRB (see orra.rutgers.edu/hspp).

Regards,



Appendix J

Table 1

Falls Data

	June 26, 2019 to October 26, 2019	October 27,2019 to February 27, 2020
Number of falls due to seizure	0	1
Location		
Bathroom and bathroom	6	0
Outside of the room	0	3
Location (excluding falls due to siezure)		
Bathroom and bathroom	6	0
Outside of the room	0	2
Location (Bathroom vs Bedroom)		
Bathroom	4	0
Bedroom	2	0
Type of fall		
Observed	0	3
Unobserved	6	0
Type of fall (excluding falls due to seizure)		
Observed	0	2
Unobserved	6	0
Demographic Information for those who fell		
Gender female	3	0
Gender male	3	3
Average age	55.6	57
Demographic Information for those who fell (excluding	g falls due to seizure)	
Gender female	3	0
Gender male	3	2
Average age	55.6	62

Demographic Information for all high fall risk patients		
Gender female	28	12
Gender male	38	19
Gender female percentage	42.4	38.7
Gender male percentage	57.6	61.3
Average age	51.7	48.6
Total falls including seizures	6	3
Total falls not including seizures	6	2
Total falls in those that received the intervention	NA	1
Total number of patients scoring 7 and above	66	31
Ratio of falls (not including seizures) in high fall risk patients : total number of high fall risk patients	0.09	0.06
Ratio of falls in high fall risk patients who had outside the room related falls (not including seizures) : total number of high fall risk patients	0	0.06
Ratio of falls in bathroom and bedroom (not including seizures) in high fall risk patients : total number of high fall risk patients	0.09	0
Ratio of falls in high fall risk patients who had bathroom related falls (not including seizures) : total number of high fall risk patients	0.06	0
Ratio of falls in high fall risk patients who had bedroom related falls (not including seizures) : total number of high fall risk patients	0.03	0
Ratio of falls (not including seizures) in high fall risk patients who received both interventions : total number of high fall risk patients	N/A	0.03
Total Number of Patients that did not receive the interventions	N/A	5
Total Number of Patients that received the interventions	N/A	26
Number of Patients that received only call bells	N/A	4
Number of Patients that received only exit alarms	N/A	2
Number of Patients that received both interventions	N/A	20
Reasons for exclusion		
a. Patient was agitated and may throw device	N/A	0
b. Patient unwilling to sleep in the bed	N/A	0

c. Patient unwilling to use the devices	N/A	3
d. Only using the call bell or only using the bed alarm	N/A	6
e. Other with a fill in the blank	N/A	2

Note. This table includes information on the number of falls, where falls occurred, demographic information, those that received the interventions, and the ratios between pre-intervention (June 26, 2019 to October 26, 2019) and post-intervention (October 27,2019 to February 27, 2020).

Appendix K

Table 1

Survey Data

	Total	Percentage
Do you feel that using call bells and exit alarms was helpful		
to communicate your patients' needs?		
A – yes	14	73.7%
B – No	0	0%
C - Maybe	5	26.3%
Do you feel call bell and exit alarms helped to prevent		
patients from falling?		
A – yes	15	78.9%
B – No	0	0%
C - Maybe	4	21.1%
Do you feel exit alarms or call bells, both, or neither are		
more effective in preventing falls?		
A – Call Bells	2	10.5%
B - Exit Alarms	2	10.5%
C – Both Call Bells and Exit Alarms	14	73.7%
D – Neither Call Bells or Exit Alarms	1	5.3%
Do you feel that using call bells and exit alarms has reduced		
your work load?		
A – yes	5	26.3%
B – No	7	36.8%
C - Maybe	7	36.8%
Total number of nurses	41	
Total number of respondents	19	
Percentage of respondents		46%

Note. This table includes information on the result of the nursing survey with the number of respondents to each question, and the percentages of participating nurses responded to each question.