# USE OF DELIRIUM PROTOCOLS IN DECREASING FALLS AMONG ADULTS IN ACUTE CARE: AN INTEGRATIVE REVIEW

A Scholarly Project

Submitted to the

Faculty of Liberty University

In partial fulfillment of

The requirements for the degree

Of Doctor of Nursing Practice

By

Shelly Steverson Thornton

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Scholarly Project Chair Approval:

Rachel Abraham Joseph, PhD, CCRN Date

## ABSTRACT

Delirium in elderly hospitalized adults continues to be a common and costly issue in health care today. Various delirium protocols and strategies are available to reduce negative outcomes of delirium such as falls, increased length of stay, pressure ulcers, hospital readmissions, the need for transferal to long-term care, and mortality rates. However, many hospitals have still not implemented routine delirium protocols. Because falls in older hospitalized adults are often linked to delirium, this integrative review was undertaken to examine delirium protocols and approaches that specifically decrease falls among older adults in acute care settings. Several multicomponent, multidisciplinary delirium protocols were found to be effective in reducing falls in 17 of the 20 studies reviewed.


*Keywords*: delirium protocols, falls, acute care, hospital, adult

## Dedication

This paper is dedicated to my beloved late parents, Willard and Anita Steverson, and my late maternal grandfather, James Whaley. As educators, they each instilled a love of lifelong learning and a respect for education in me that has inspired me throughout my nursing and academic career.

**Acknowledgments**

I have so many for whom I am thankful, and I hope I do not leave anyone out. I wish to thank first of all my Lord and Savior, Jesus Christ. With Him all things can be achieved. He is infinitely gracious and merciful.

I would like to thank my husband and children for being supportive and understanding of the time required to complete this project. I love you all so much.

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To the nursing faculty at Liberty University: Thank you for the effort you pour into your students to ensure a rigorous, high-quality nursing education. During these past several months of the COVID-19 pandemic, you have all shown kindness, understanding, leadership, and flexibility. For that, I am so very grateful. You are all truly inspiring.

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## List of Abbreviations

Acute Care for Elders (ACE)

Confusion Assessment Method (CAM)

Coronavirus disease 2019 (COVID-19)

DELirium Team Approach (DELTA)

Doctor of Nursing Practice (DNP)

Hospital Elder Life Program (HELP)

Institutional Review Board (IRB)

Level of Evidence (LOE)

Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA)

Randomized controlled trials (RCTs)

# SECTION ONE: FORMULATING THE REVIEW QUESTION

## Introduction

Delirium occurs in 10%–64% of all hospitalized patients and costs $152 billion annually in the United States (Rohatgi et al., 2019). Approximately 50% of elderly hospitalized patients are affected by delirium (Hshieh et al., 2018) and experience increased rates of falls, pressure ulcers, morbidity, and mortality (Casey, 2019). Older patients with delirium have an increased risk of institutionalization and hospital readmissions (Kuczmarska et al., 2016). Delirium is also associated with a longer length of hospital stay (Guthrie & Rayborn, 2018). Hospitals implement delirium protocols to manage patients and prevent complications in acute care settings. However, this is not a standard of care in all acute care hospitals.

## Defining Concepts and Variables

### *Delirium Definition and Delirium Risk Factors*

Delirium is an acute change in mental status (Rohatgi et al., 2019). Older adults in the hospital setting are at risk for delirium for numerous reasons. Two main classifications of delirium risk factors exist: predisposing and precipitating (Marcantonio, 2017). *Predisposing* risk factors are risk factors already present such as advanced age, cognitive impairment, functional disabilities, psychiatric disorders, sensory impairments, history of substance or alcohol abuse, diabetes, being male, neurological disorders, history of a stroke, atrial fibrillation, and residing in an institution (Guthrie & Rayborn, 2018; Marcantonio, 2017). Examples of *precipitating* risk factors include medications such as sedatives and anticholinergics, surgical procedures, anesthesia, pain, anemia, acute infections, dehydration, sleep disturbances, lab abnormalities, acute illness, and worsening of a chronic illness (Bond & Goudie, 2015; Marcantonio, 2017). A combination of various predisposing and precipitating risk factors may be present, thus elevating

the overall risk of delirium. Like the differing risk factors for delirium, episodes of delirium also vary regarding symptoms and severity.

### *Delirium Subtypes and Symptoms*

Three subtypes of delirium have been identified. The hyperactive subtype of delirium is exhibited as restlessness, agitation, confusion, and wandering (Guthrie & Rayborn, 2018). Hallucinations are also possible (Ignatavicius et al., 2018). In contrast, a patient with the harder-to-recognize hypoactive subtype exhibits reduced psychomotor activity, confusion, and decreased alertness (Babine et al., 2018). The mixed subtype of delirium presents with hyperactive and hypoactive subtype symptoms that fluctuate within short periods of time. Inouye et al. (2014) cautioned that worse outcomes are associated with the hypoactive form of delirium in elderly adults. Management of delirium differs according to the subtype and/or symptoms, as well as types of delirium protocols or approaches.

### *Delirium Care Guidelines*

Standardized protocols with a multicomponent approach of prevention, screening, diagnosis, and treatment exist for effective delirium care (Babine et al., 2013). Current evidence-based guidelines for delirium care include: eliminating or mitigating precipitating risk factors, performing a routine cognitive assessment, utilizing a standardized delirium screening tool routinely and when a change in condition occurs, reviewing medications to eliminate high-risk medications, and providing staff education on delirium (Guthrie & Rayborn, 2018). Other delirium treatment interventions include involving geriatric specialists, promoting sleep and hydration, promoting physical activity, providing therapeutic activities, providing eyeglasses and hearing aids, and reorienting patients (Babine et al., 2013; Marcantonio, 2017). The established multicomponent, multidisciplinary delirium protocol Hospital Elderly Life Program (HELP)

designed by Inouye and colleagues (2000) has been implemented in many facilities with success (Babine et al., 2013). The HELP consists of a team of volunteers, an advanced practice nurse, and a geriatrician that assesses older patients for delirium risk factors and develops patient care plans (Inouye et al., 2000). These care plans are utilized by specially trained volunteers that have been recruited from the community and local health care organizations. The care plans include reorienting all HELP patients to time and location, engaging patients in therapeutic activities, physical activity such as ambulating and range-of-motion exercises, assisting patients with nutritional or fluid intake, providing glasses or hearing aids, and facilitating relaxation techniques and sleep routines (Babine et al., 2013; Inouye et al., 2000). Interdisciplinary rounds and provider education are also included in the HELP (Inouye et al., 2000).

Pharmacological treatment of delirium has historically been controversial, particularly regarding the use of psychotropic medications and sedatives. The typical antipsychotic drug haloperidol has a long record of use for delirium and continues to be studied, while atypical antipsychotics such as risperidone and ziprasidone have been used less frequently because of their relatively large sedating effect (Marcantonio, 2017). Treatment with antipsychotics or sedatives may play a role in the mixed subtype of delirium, causing a patient's hyperactive delirium to switch to hypoactive delirium and possibly even lengthening the duration of delirium, resulting in negative outcomes (Inouye et al., 2014).

### *Variables of Interest*

A plethora of articles exists on both delirium and falls in the acute care setting. For precision in the evaluation of articles for this review, the leader of this project clarified the problem and the variables of interest. The problems identified included the high prevalence of delirium among the elderly, the lack of a standard process for delirium prevention, identification,

and treatment in hospitals, and a higher rate of falls among those with delirium. Variables of interest included currently available delirium protocols or strategies, effective implementation of delirium protocols or strategies, and falls in elderly adults with delirium.

**Rationale for Conducting the Review**

Despite its prevalence in hospitalized patients, delirium is often underrecognized and undertreated (Kuczmarska et al., 2016), resulting in falls leading to increased morbidity and mortality. Ferguson et al. (2018) reported that 96% of in-hospital patient falls were linked to delirium and that a staggering 15,800 deaths among adults older than 65 years have occurred due to falls in the US alone. Over one million falls occur annually in U.S. hospitals, resulting in an estimated 34 billion dollars of cost for falls-related care (Bjarnadottir & Lucero, 2018). In a retrospective cohort study by Morello et al. (2015), the mean additional financial burden of an in-hospital fall was $6,669. Hospital falls cause patients to be less confident and less independent; this impedes recovery from illness or surgery (Morello et al., 2015). Even without an injury, a hospital fall is an emotional stressor to the patient and family members. Many facilities do not routinely screen patients for delirium and likewise do not have an established delirium management protocol. Because of the costly negative outcomes associated with delirium, managing delirium is a priority. A preliminary literature review confirmed the need for an integrative review to discover effective methods that address falls secondary to delirium in adults in the acute care setting. The following facts will be used to support this project:

1. Delirium is a widespread problem in hospitalized older adults.
2. Negative outcomes of delirium are numerous and costly.
3. Delirium can result in falls among older hospitalized adults which can be prevented; thus, by addressing delirium, fall rates can also be addressed.

## Purpose and Review Question

### *Purpose of the Project*

This project sought to determine if the use of a delirium protocol for older adults in acute care settings would reduce falls in patients with delirium. For the purpose of this integrative interview, *adult acute care* is defined as an adult hospital unit that is not a mental health unit or critical care unit, and *older adult* is defined as an adult 65 years of age and older. Search terms included *delirium protocol, delirium treatment, falls, acute care,* and *hospital.* The project leader examined the literature for delirium protocols and delirium-associated patient falls and synthesized the selected articles. Potential areas for further research and implications for nursing practice were also identified. An evidence table (Appendix A) was created to systematically review and organize the published findings regarding the methodology, setting, sample characteristics, results, level of evidence and source type, limitations, and applications. The publications were synthesized and the protocols were compared and reported.

### *Review Question*

Many concerns exist for patients experiencing delirium, including falls, prolonged hospitalization, hospital readmissions, increased mortality, and pressure ulcers. According to Ambutas et al. (2017), falls are the most common inpatient incident and can result in injuries, prolonged length of hospital stay, and death. The risks of other adverse events such as infection, serious medication side effects, and mortality rates are higher with prolonged hospitalization (Baek et al., 2018). With these concerns in mind, the following clinical question was posed by the project leader: Is there an effective delirium protocol used for adults aged 65 and older in an acute care setting that decreases falls?

### *Project Goals*

The goals of this project were:

1. To present a systematic review of the evidence pertaining to delirium protocols that decrease falls in older adult patients of acute care settings.
2. To identify gaps in literature and provide evidence-based recommendations for further research.
3. To present evidence-based recommendations for nursing practice.

## Formulate Inclusion and Exclusion Criteria

The question this integrative review was undertaken to answer is the following: Is there an effective delirium protocol used for older adults in an acute care setting that decreases falls? This question was refined through careful consideration of the topic and associated outcomes of interest. Next, inclusion and exclusion criteria for the review were chosen.

Inclusion criteria applied to this integrative review includes articles published no earlier than 2010 to the current date. Further criteria included articles that are relevant to delirium or falls associated with delirium, are about adults aged 65 and older, involve acute care settings, and are from the US and other countries. Exclusion criteria were articles that are not peer reviewed, were written prior to 2010, are not published in English, or are about long-term care, mental health units, critical care units, or pediatric units. Inclusion and exclusion criteria are summarized in Table 1.

**Table 1**

*Inclusion and Exclusion Criteria*

| Criterion | Inclusion | Exclusion |
|---|---|---|
| Publication year | 2010 to 2020 | Before 2010 |
| Health care setting | Acute care setting, hospital setting | Psychiatric unit, critical care unit, long-term care, emergency room, outpatient facilities |
| Subjects | Adults 65 years and older | Adults younger than 65 years and pediatric patients |
| Type of article | Peer-reviewed | Non-research |
| Text availability | Full-text articles | Abstract-only articles |

## Conceptual Framework

The research-on-research method of the integrative review must meet the same high standards as primary research (Whittemore & Knafl, 2005). Liberati et al. (2009) lamented that important information is often not well reported in systematic reviews. Thus, it is imperative to apply a conceptual framework that ensures rigor. This review used the step-by-step approach of synthesis provided by Cooper (2010), the framework described by Whittemore & Knafl (2005), and the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) (Liberati et al., 2009).

### *Cooper*

Cooper (2010) provided a step-by-step approach to a research synthesis and meta-analysis. The steps include formulating the problem, searching the literature, gathering information from studies, evaluating the quality of the studies, analyzing and integrating the outcomes of the studies, interpreting the evidence, and presenting the results (Cooper, 2010). While Cooper's framework ensures rigor for a systematic review or meta-analysis, it is not as useful for the integrative review when compared to the framework provided by Whittemore and Knafl (2005).

### *Whittemore and Knafl*

Evidence-based practice initiatives have increased the need for various types of literature reviews in health care (Cooper, 2010; Whittemore & Knafl, 2005). The integrative review differs from other methods of literature review due to the inclusion of studies of various methodologies. It is useful in the translation of evidence into practice because it provides a summary of past empirical and/or theoretical literature, thus enabling a more thorough understanding of a health care problem (Whittemore & Knafl, 2005). The conceptual framework modified specifically for the integrative review by Whittemore and Knafl (2005) was applied to this review and comprises the following five stages: problem identification, literature search, data evaluation, data analysis, and presentation.

### *Preferred Reporting Items for Systematic Reviews and Meta-Analysis*

The PRISMA Statement is also essential for effective reporting in a systematic review. Composed of a 27-item checklist and a diagram with four phases, the PRISMA Statement facilitates transparency and promotes rigor (Liberati et al., 2009). The major categories of the 27-item checklist are: title, abstract, introduction, methods, results, discussion, and funding. The four phases displayed in the PRISMA diagram include identification of records, screening with removal of duplicates, eligibility assessment of full-text articles, and inclusion of final studies selected for synthesis (Liberati et al., 2009). The PRISMA checklist was used as a framework to organize, eliminate, and finalize the articles reviewed.

## SECTION TWO: COMPREHENSIVE AND SYSTEMATIC SEARCH

### Search Organization and Reporting Strategies

A literature search should be organized, thorough, and conducted by applying relevant search terms and assessing valid sources of knowledge. An electronic search through the Liberty

University Jerry Falwell Library was conducted to locate articles on delirium protocols affecting fall rates in acute care settings for adults aged 65 and older. The studies were examined and analyzed. An evidence table (Appendix A) and the PRISMA flow diagram (Appendix B) were developed to display the process of article selection and provide summaries of studies included in this review. The articles included were peer reviewed, in English, no older than 10 years, and pertained to older adults, delirium, acute care hospital settings, and falls.

**Terminology**

Because searching just one database could limit the number of relevant studies, three databases were accessed. The software used to deliver a database is known as a *platform*, and the term *database* is defined as a searchable electronic collection of published articles (Toronto & Remington, 2020). The databases used for this review were ProQuest, CINAHL Plus with Full Text, and MEDLINE with Full Text. CINAHL Plus with Full Text is available on the EBSCO platform, while ProQuest and MEDLINE with Full Text are available on the ProQuest platforms (Toronto & Remington, 2020). The search interface, a search page used to search keywords and apply limiters (Toronto & Remington, 2020), was used to conduct an advanced search. Keywords and the Boolean operator AND reduced the number of articles to include only those that contained keywords in the first and second group (Toronto & Remington, 2020). These keywords used for the search were *delirium protocol*, *delirium treatment*, *falls, acute care*, and *hospital.* Limiters included being peer reviewed, printed in English, and published from 2010–2020.

## SECTION THREE: MANAGING THE COLLECTED DATA

A comprehensive search was performed using the three databases of ProQuest, CINAHL Plus with Full Text, and MEDLINE with Full Text and the keywords *delirium protocol*, *delirium*

*treatment*, *falls*, *acute care*, and *hospital*. The literature search was conducted from mid-April until June of 2020. A total of 1,385 records were identified using the above databases, and an additional 10 articles were located using an ancestry approach. After duplicates were removed and abstracts screened, 100 full-text articles were reviewed for eligibility. Eighty full-text articles were excluded for any of the following reasons: fall rates post-delirium intervention were not mentioned, there was no delirium treatment, or the setting was not an adult acute care setting. Twenty articles were finally selected for synthesis. An evidence table ranking articles on level of evidence according to Melnyk's Hierarchy of Evidence was applied and included (Appendix A). A professional librarian was consulted for assistance narrowing down and removing duplicates from the very large number of articles identified.

## SECTION FOUR: QUALITY APPRAISAL

### Sources of Bias

#### *Risk of Bias in Individual Studies*

Toronto and Remington (2020) cautioned that bias is possible during any part of the integrative review. Potential sources of bias within an individual study include selection bias that can occur when differences exist between study groups, measurement bias due to poorly trained research personnel or unreliable instruments, attrition bias that can occur when participants drop out of a study, and performance bias due to a group of study participants receiving more attention (Toronto & Remington, 2020). Qualitative studies are reviewed for potential bias by evaluating concepts of trustworthiness such as the transferability of findings to other settings, credibility of the study, dependability of methods, and the confirmability of the data (Toronto & Remington, 2020). Liberati et al. (2009) noted that authors should detail the method used to assess for bias in individual studies in the form of a scale, checklist, or discussing individual

components. An evidence table (Appendix A) was utilized in this integrative review to address potential bias within individual studies. Methodological rigor in each study was assessed based on Melnyk's Level of Evidence (LOE), and a hierarchy of evidence was created. The following describes Melnyk's LOE: Level I applies to systematic reviews and meta-analyses of randomized controlled trials (RCTs), a Level II study includes one or more RCTs, a Level III study is a controlled trial without randomization, Level IV applies to a case-control or cohort study, a Level V study is a systematic review of descriptive and qualitative studies, Level VI applies to a single descriptive study or qualitative study, and a Level VII study is an expert opinion (Melnyk & Fineout-Overholt, 2015).

### *Risk of Bias Across Studies*

Bias across studies can occur if data is missing from an individual study within a systematic review and could affect the cumulative evidence (Liberati et al., 2009). For example, publication bias can occur if relevant studies are not published and thus are not available for a systematic review (Toronto & Remington, 2020). This could result in an overestimation of the effect of an intervention (Cooper, 2010). Another example of bias is selective reporting within a study (Liberati et al., 2009). To address the risk of bias across studies, the project leader included 20 studies and noted within an evidence table if relevant data were missing. The PRISMA tool was used to select the articles used in the final analysis, thereby reducing the bias in article selection (see Appendix B).

## Internal Validity

Internal validity refers to the believability and possible risk of bias of an individual study (Toronto & Remington, 2020). According to Whittemore & Knafl (2005), evaluating the quality of sources in an integrative review can be a difficult process. To evaluate internal

validity, characteristics of each individual study were summarized with the use of an appraisal tool, the evidence table (Appendix A). Each article that met the criteria was chosen carefully and critically appraised for evidence to ensure validity.

**Appraisal Tool (Evidence Table)**

The appraisal tool for internal validity was an evidence table containing characteristics of the individual studies. The characteristics included in this table are: author/year, study purpose and objective, design/sampling method/subjects, level of evidence according to Melnyk's Level of Evidence Pyramid, interventions and outcomes, results, and study strengths and limitations.

**Applicability of Results**

The generalizability, also known as external validity, of an integrative review refers to the extent that the findings can be applied to a population of interest (Toronto & Remington, 2020). If a bias exists, the trustworthiness of results is impaired. An underestimation or overestimation of the effects of an intervention is then possible, which in turn decreases the generalizability of the findings. External validity was addressed by the inclusion of limitations of individual studies within the evidence table and a discussion of this integrative review's limitations.

**Reporting Guidelines**

The literature search process of the integrative review needs to be outlined and encompass search terms, databases, additional search strategies, and inclusion/exclusion criteria (Whittemore & Knafl, 2005). These items were included in the method section. Additionally, the PRISMA flow diagram (Appendix B) displays the process of final article selection. The PRISMA Statement guidelines for systematic reviews were created by review authors,

methodologists, clinicians, medical editors, and consumers to increase quality and transparency in reporting of the reviews (Liberati et al., 2009).

## SECTION FIVE: DATA ANALYSIS AND SYNTHESIS

### Data Analysis: Constant Comparison Method

The studies used in this review are of various methodologies, and thus data analysis was completed using the constant comparison method. The constant comparison method facilitates comparison of extracted data so that similar data are grouped together and compared; this method lends itself well to the integrative review (Whittemore & Knafl, 2005). There are four phases of the constant comparison method as described by Toronto & Remington (2020): data reduction, data display, data comparison, and conclusion drawing and verification.

#### *Data Reduction*

Data reduction is the process of selecting, simplifying, and abstracting data from studies to place them in a classification system such as a subgroup of evidence type (Whittemore & Knafl, 2005). During the first phase of data reduction, variables that were applied to pursue data include chronology, subject matter, inclusion criteria, and setting. After reducing the data, the project leader read through the articles and selected the final articles for analysis based on pertinency; at this stage, it is appropriate to exclude articles that do not align with the phenomenon of interest (Cooper et al., 2019). The second phase of data reduction involves extracting and coding data to organize them into a workable framework (Whittemore & Knafl, 2005). These data were placed in the evidence table (Appendix A) and a comparison table (Appendix C) so that characteristics from each study could be summarized and compared. In the third phase, the data were clustered into different groups based on the fall reporting method. Seven studies that reported falls per 1,000 patient days were placed in Table 3, and 10 studies

that reported the number of falls were placed in Table 4. One study reported the percentage of reduction in falls, one reported the number of falls per length of stay, and another study reported a reduction in falls but did not provide the fall rate or number of falls (see Appendix C).

### *Data Display*

The data are displayed in a table that reveals patterns of study purpose, sample characteristics, methodology, level of evidence, interventions and outcomes, results, and study strengths and limitations. The evidence table (Appendix A) is used to display the characteristics of these studies, and a comparison table (Appendix C) displays a comparison of the various delirium protocols and approaches, number of participants, and falls/fall rates. Four systematic reviews with a meta-analysis were included in this review; the number of articles and RCTs in each of these is displayed in Table 2.

**Table 2**

*Systematic Reviews with Meta-Analysis*

| Study | Number of articles | Number of RCTs |
|---|---|---|
| Fox et al. (2012) | 19 | 6 |
| Hirsch (2015) | 14 | 4 |
| Hshieh et al. (2018) | 44 | 2 |
| Hshieh et al. (2015) | 14 | 4 |
| Total | 91 | 16 |

*Note.* RCT = Randomized controlled trial.

### *Data Comparison*

During this stage of the review, the data from studies were compared based on the type of delirium protocols or approaches and outcomes. These variables of interest were displayed in an evidence table and comparison tables to provide for a succinct visual comparison. Further comparison of articles with different fall data reporting methods are presented in tables: six studies reporting falls per 1,000 patient days are presented in Table 3, and 10 studies reporting

the number of falls are displayed in Table 4. The four systematic reviews with meta-analyses include a total of 91 articles and 16 RCTs; numbers of articles and RCTs for each of these individual studies are presented in Table 2.

**Table 3**

*Comparison: Studies Reporting Falls per 1,000 Patient Days*

| | | | Falls per 1,000 patient days | |
|---|---|---|---|---|
| Study | Protocols | Participants | Control/ preintervention | Intervention |
| Babine et al. (2013) | HELP, CAM | 158 | 5.15 | 2.49 |
| Babine et al. (2018) | HELP, CAM | 206 | 2.81 | 2.16 |
| Ferguson et al. (2018) | HELP, CAM | 7,154 | 0.75 | 0.50 |
| Flaherty & Little (2011) | Delirium Room within an ACE Unit, CAM | 148 | 5.30 | 3.70 |
| Hirsch (2015) | HELP | 4,267 | 12.90 | 4.30 |
| Laws & Crawford (2019) | Risk factor table, delirium tip sheet, lightning round questions | | 0.47 | 0.00 |
| Total | 6 studies | 11,933 | 27.38* | 13.15** |

*Note.* HELP = Hospital Elderly Life Program; CAM = Confusion Assessment Method; ACE = Acute Care for the Elderly

*Average = 4.56.

**Average = 2.19.

**Table 4**

*Comparison: Studies Reporting Number of Falls*

| | | | Number of falls | |
|---|---|---|---|---|
| Study | Protocols/tools used | Participants | Control/ preintervention | Intervention |
| Gonski et al. (2012) | Behavioral unit for aged care | 41 | | 6 |
| Hshieh et al. (2018) | HELP, CAM | 3,605 | 58 | 23 |
| Hshieh et al. (2015) | HELP, CAM | 4,267 | 95 | 24 |
| Jones & Taylor (2019) | CAM | 186 | 8 | 7 |
| Krall et al. (2012) | ACE unit with GRN | 435 | 6 | 0 |
| Loftus et al. (2017) | CAM, NICHE training, GRN | 186 | 2 | 2 |
| Mudge et al. (2013) | Multicomponent delirium protocol, CAM | 206 | 6 | 4 |
| Ogawa et al. (2019) | DELTA, CAM | 7,977 | 160 | 136 |
| Perez-Zepeda et al. (2012) | GEM, CAM | 210 | 0 | 0 |
| Toye et al. (2017) | CAM, staff education program | 9 | 9 | 3 |
| Total | 11 studies | 17,122 | 362* | 205** |

*Note.* Blanks indicate missing data. HELP = Hospital Elderly Life Program; CAM = Confusion Assessment Method; ACE = Acute Care for Elderly; GRN = Geriatric resource nurse; NICHE = Nurses Improving Care for Health System Elders, DELTA = DELirium Team Approach; GEM = Geriatric evaluation and management unit.
*Average = 32.9.
**Average = 18.6.

### *Conclusion Drawing and Verification*

After an analysis of studies included in a systematic review, interpretations must be made about the cumulative evidence (Cooper, 2010). During the conclusion drawing stage, subgroups of various types of delirium protocols and approaches were identified in comparison tables and differences and similarities identified. A synthesis of the conclusions for each subgroup was created in narrative form.

## Descriptive Results

There were 20 studies in this integrative review. The studies varied by type of research and design. All of the studies were quantitative. There were four systematic reviews (Fox et al., 2012; Hirsch, 2015; Hshieh et al., 2015, 2018) 15 quasi-experimental studies (Babine et al., 2013, 2018; Blair et al., 2018: Bond & Goudie, 2015; Dean, 2012; Ferguson et al., 2018; Flaherty & Little, 2011; Gonski & Moon, 2012; Jones & Taylor, 2019; Krall et al., 2012; Laws & Crawford, 2013; Mudge et al., 2013; Ogawa et al., 2019; Pérez-Zepeda et al., 2012; Toye et al., 2017), and one observational study (Loftus & Wiesenfield, 2017). Nine articles were published between 2011 and 2014, five articles were published between 2015 and 2017, and six articles were published between 2018 and 2019. The findings from the review are presented below.

### *Use of a Delirium Protocol to Decrease Falls*

In 17 of the 20 articles, falls were decreased at varying rates as a result of delirium protocols or approaches (Babine et al., 2013, 2018; Bond & Goudie, 2015; Dean, 2012; Ferguson et al., 2018; Flaherty & Little, 2011; Fox et al., 2012; Gonski & Moon, 2012; Hirsch, 2015; Hshieh et al., 2015, 2018; Jones & Taylor, 2019; Krall et al., 2012; Laws & Crawford, 2013; Mudge et al., 2013; Ogawa et al., 2019; Toye et al., 2017). Two of the studies yielded no significant difference in fall rates (Blair et al., 2018; Loftus & Wiesenfield, 2017). In one study, there were no falls in the intervention or control groups; thus, the authors were unable to conclude that delirium protocols decreased falls (Pérez-Zepeda et al., 2012). In their study, Bond and Goudie (2015) noted a decrease in falls yet did not include the number of participants or exact impact on falls; this was because the authors were highlighting outcomes of a delirium protocol that was implemented on a national scale in Scotland, and complete data was not yet

available. Gonski and Moon (2012) wrote that six falls occurred in their study and indicated this was a reduction in falls, yet they did not include a comparison. Toye et al. (2017) reported a reduction in total falls; however, nine falls occurred in five patients before intervention and three falls occurred in four patients postintervention.

### *Types of Delirium Protocols and Approaches*

In six of the studies, the resource-intensive, multicomponent, multidisciplinary HELP delirium protocol was utilized (Babine et al., 2013, 2018; Ferguson et al., 2018; Hirsch, 2015; Hshieh et al., 2015, 2018). One study implemented a Golden Angel Volunteer program to address delirium (Blair et al., 2018). An Acute Care for Elders (ACE) unit was utilized in three studies (Flaherty & Little, 2011; Fox et al., 2012; Krall et al., 2012); a delirium room was also included in the ACE unit in one of these studies (Flaherty & Little, 2011), while geriatric resources nurses were placed with the ACE unit in another (Krall et al., 2012). One study employed the Alertness, Abbreviated Mental Test, Attention, and Acute Change test in combination with the Think/Triggers, Investigate/Intervene, Manage, Engage/Explore delirium care bundle (Bond & Goudie, 2015). A geriatric evaluation and management unit was examined in one study (Pérez-Zepeda, 2012). The FallSafe bundle—a multicomponent fall prevention bundle that includes a cognitive screen and delirium screen—was employed in one study (Dean, 2012).

Other protocols included admission to a behavioral unit that specialized in multicomponent delirium care for elderly patients in one study (Gonski & Moon, 2012), the use of Nurses Improving Care for Health System Elders in another study (Loftus & Wiesenfield, 2017), and the multicomponent DELirium Team Approach (DELTA) in a study that was hospital-specific (Ogawa et al., 2019). Another hospital-specific multicomponent delirium

protocol evaluated in one study combined a risk factor table, delirium tip sheet with prevention strategies, and lightning rounds with scripted questions by the hospitalist, staff nurse, patient care coordinator, and nurse manager (Laws & Crawford, 2013). There were two more studies on hospital-specific multicomponent delirium protocols (Mudge et al., 2013; Toye et al., 2017), and one remaining study that piloted only a delirium screening tool (Jones & Taylor, 2019).

### *Delirium Screening Tools*

The Confusion Assessment Method (CAM) delirium screening tool was applied in 12 of the studies (Babine et al., 2013, 2018; Blair et al., 2018; Ferguson et al., 2018; Flaherty & Little, 2011; Hshieh et al., 2015, 2018; Jones & Taylor, 2019; Loftus & Weisenfield, 2017; Mudge et al., 2013; Ogawa et al., 2019; Toye et al., 2017). Another version of the CAM for the intensive care unit, the CAM-ICU, was used in one study, even though the study did not take place in an intensive care unit (Pérez-Zepeda et al., 2012). The Alertness, Abbreviated Mental Test, Attention, and Acute Change was the delirium screening tool for one study (Bond & Goudie, 2015). One study implemented a delirium screening tool that is embedded within the FallSafe fall prevention bundle (Dean, 2012). A hospital-specific tool called a Delirium Tip Sheet that included a delirium assessment was used in one study (Laws & Crawford, 2013). The remaining four studies did not specify the delirium screening tool that was used, although delirium screening was part of the delirium protocol (Fox et al., 2012; Gonski et al., 2012; Hirsch, 2015; Krall et al., 2012).

## Synthesis

Substantial literature exists on delirium, delirium protocols and approaches, and delirium outcomes in older adults. Extensive literature on falls among older adults in acute care settings is also available. However, there is a paucity of studies—particularly RCTs—to specifically

pinpoint the effects of delirium protocols or approaches on rates of falls within this population and setting. The evidence that is available indicates multicomponent, multidisciplinary delirium protocols are effective in decreasing fall rates in older adults and suggests that the HELP and DELTA are among the most effective of these for acute care (Babine et al., 2013, 2018; Hirsch, 2015; Hshieh et al., 2015; Ogawa et al., 2019). A majority of the studies (13) utilized the well-established CAM screening tool for delirium screening, and it is noteworthy that six of the studies utilized the HELP delirium protocol. Altogether, 15 different delirium protocols and approaches were identified in this review; the approaches varied from the use of a delirium screening tool alone, to the use of a multicomponent multidisciplinary protocol, to use of a specialized elderly care unit and/or specialized delirium unit.

### *Additional Analysis*

Further analysis of the literature indicated the strength of evidence is moderate to strong because several studies directly answered the clinical question. The overall strength of evidence is moderate to strong, despite a lack of primary source RCTs. According to Melnyk's LOE that ranks evidence from Level I to VII, the level of evidence in 75% of these studies was Level III, 20% were Level I, and only one study was Level VI. The Level I studies, systematic reviews with meta-analyses, included a total of 16 RCTs (see Table 2).

The CAM delirium screening tool has been used extensively in clinical practice because it only requires five to 10 minutes to complete and has proven through research to be highly sensitive and specific for delirium (Greene et al., 2019; Inouye et al., 2014). Kuczmarska et al. (2016) described the CAM as the most effective screening tool for delirium. The CAM is the delirium screening tool used most often; it has been utilized in over 4,000 published studies, adapted in various healthcare settings, and translated into over 12 languages (Inouye et al.,

2014). Hence, 13 studies in this review utilized the CAM. However, inconsistencies in the use and application of delirium screening tools and delirium protocols within a single setting were identified in this review and point to a need for further staff education and training. (Hshieh et al., 2018; Loftus & Weisenfield, 2017). Another barrier to consistent implementation of delirium protocols uncovered by this review is that some protocols, particularly those including volunteers, have heavy resource requirements that render them unsustainable in their entirety for some facilities (Babine et al., 2013; Ferguson et al., 2018; Hshieh et al., 2018).

**Ethical Considerations**

The project leader completed the Collaborative Institutional Training Certificate modules prior to the beginning of this review according to institutional requirements. A copy of the completion certificate is included as Appendix D. The project leader submitted the project to the Liberty University Institutional Review Board (IRB). The IRB responded with an email stating the project is exempt. The e-mail response from the IRB is included as Appendix E.

**Timeline**

A timeline for this integrative review was established prior to the initial defense of this review as the project leader's scholarly project. The project leader set and met a deadline of May 2020 for IRB approval. A goal to begin the integrative review was set and achieved no later than mid-May of 2020. The project leader anticipates completion of this review by the end of August of 2020, with the submission of the final project to Liberty University's Scholars Crossings by September of 2020. This timeline is displayed in Table 5.

**Table 5**

*Project Timeline*

| Task | Target date | Met/not met |
|---|---|---|
| IRB approval | May 15, 2020 | Met |
| Begin IR | May 15, 2020 | Met |
| Final defense | Aug. 31, 2020 | Met |
| Submit to Scholars Crossings | Sept. 15, 2020 | Pending |

*Note.* IR = Integrative review.

## SECTION SIX: DISCUSSION

Analysis revealed that multicomponent delirium protocols or approaches lower fall rates of older adults in acute care settings. Seventeen of the 20 articles directly fulfilled the purpose of this review to determine if delirium protocols or approaches decrease fall rates. Insight was gained regarding the variety of multicomponent, multidisciplinary delirium protocols or approaches used. Further insight was also gained regarding the effectiveness of the different protocols and the popularity of the CAM delirium screening tool.

Eleven of the 13 studies involving 27,840 total participants using a multicomponent delirium protocol, four out of five studies with 7,673 total participants utilizing specialized geriatric units or delirium units, the study of 186 participants that implemented only a delirium screening tool (the CAM), and the study of 7,680 participants implementing a fall protocol that includes delirium screening (FallSafe) all demonstrated a decrease in falls. The studies with the most significant reductions in falls or fall rates utilized the HELP and DELTA protocols. These two programs differ in that the HELP was utilized in different hospitals, whereas the DELTA program was implemented in one large cancer hospital. Comparisons of the various protocols and approaches, number of participants, and fall rates are displayed in Appendix C, and fall reporting methods are expanded upon in Table 3 and Table 4. Research also determined that

more education and training are needed for nursing staff to address the inconsistent implementation of delirium screening and protocols. Full implementation of resource-intensive delirium protocols is not feasible in all settings, resulting in the need for modified approaches.

**Limitations**

There are several limitations to this review. The studies selected for final review and analysis were limited to the acute care setting and the older adult population; this represents a risk for bias within and across these studies and hinders the generalizability of the findings. A risk for bias also exists because many of the studies involved small sample sizes (Babine et al., 2013; Blair et al., 2018; Gonski & Moon, 2012; Jones & Taylor, 2019; Krall et al., 2012; Loftus & Weisenfield, 2017; Pérez-Zepeda et al., 2012; Toye et al., 2017). Four of the 20 studies were secondary sources (Fox et al., 2012; Hirsch, 2015; Hshieh et al., 2015, 2018). Most of the studies were quasi-experimental studies (Babine et al., 2013, 2018; Blair et al., 2018; Bond & Goudie, 2015; Dean, 2012; Ferguson et al., 2018; Flaherty & Little, 2011; Gonski & Moon, 2012; Jones & Taylor, 2019; Krall et al., 2012; Laws & Crawford, 2013; Mudge et al., 2013; Ogawa et al., 2019; Pérez-Zepeda et al., 2012; Toye et al., 2017). One study was observational (Loftus & Weisenfield, 2017). A lack of primary source RCTs exist because RCTs are often not feasible in real-world settings; it is difficult to withhold information from staff and patients involved, and there are ethical implications for providing some patients with treatment while withholding it from others (Murphy et al., 2018). For these reasons, a quasi-experimental approach is often utilized in clinical settings to evaluate the outcomes of a new intervention (Murphy et al., 2018).

The studies did not describe the fall outcomes in the same manner; some studies provided the number of falls within a set period of time while others described fall outcomes as the number of falls per 1,000 patient hours, the number of falls per length of stay, or as a risk ratio.

Data such as the number of total participants or fall rates were missing in two studies (Bond & Goudie, 2015; Laws & Crawford, 2013). This review was conducted by a single reviewer. Thus, the potential for bias exists due to the lack of cross-checking by a second reviewer.

While studies from Australia, England, Canada, Scotland, Japan, and Mexico were included in this review, nine of the 20 studies were conducted in the US. Additional articles could have been located through the use of additional search terms and/or databases. However, the use of three major comprehensive databases and ancestry searches yielded stronger publications on the topic. The use of Melnyk's LOE tool to appraise the evidence and the support of a librarian can be considered major strengths of this review.

## Implications for Practice and Future Work

### *Implications for Practice*

Delirium is a widespread complication for older adults in acute care. However, research indicates delirium is missed and therefore not adequately managed all too often. Falls among older adults comprise one very costly subset of poor delirium-associated outcomes. Addressing delirium is important in addressing fall rates and has the potential to save over 34 billion dollars in health care costs in the US alone (Bjarnadottir & Lucero, 2018). It is imperative that hospitals admitting older adults adopt and sustain a multicomponent, multidisciplinary delirium protocol.

In current times, the coronavirus disease 2019 (COVID-19) pandemic presents a real concern for the health of elderly adults. Severely ill hospitalized patients with COVID-19 of all ages have a 60%–70% risk of developing delirium, and early studies indicate that delirium may serve as an early indicator of the severity of illness and contribute to poorer outcomes of elderly adults (O'Hanlon & Inouye, 2020). Thus, early screening for delirium and delirium management should be included in the care of COVID-19 patients, even if delirium management strategies

such as physical activities and the use of volunteers are modified due to the necessary strict infection control measures (O'Hanlon & Inouye, 2020).

### *Implications for Education*

Nurses should be trained to use delirium training tools effectively and routinely for the early identification of delirium. Education on the prevention, screening, and management of delirium should be ongoing for nurses and include various strategies such as case studies and online modules (Jones & Taylor, 2019). Training and education for nursing students should also include delirium prevention, screening, and management. Simulation in nursing education ensures that each student experiences a patient situation (Billings & Halstead, 2012); thus, simulation with delirium scenarios should be included in nursing program curriculums.

### *Implications for Future Research*

There is a need for research with larger sample sizes to further evaluate the effectiveness of delirium protocols in decreasing falls among older adults in acute care settings. While the lack of RCTs should ideally be addressed by further research using randomization with larger groups, this would prove difficult in many hospitals. Research focused on the cost-effectiveness of modified delirium protocols better suited to hospitals with limited resources is also recommended. Additionally, research on delirium in elderly adults with COVID-19 is needed to provide future guidance for adopting effective modifications of delirium strategies during a pandemic.

## Dissemination

The final stage of research is dissemination, a purposeful process of presenting research findings to a targeted audience (Toronto & Remington, 2020). Numerous methods of dissemination are available for this integrative review. The project leader will first convey the

results of this review to the project chair and an audience of invited peers and nursing professors from Liberty University during the final project defense. After successfully defending and editing the final project, the project leader will submit this integrative review for publication in the Scholars Crossings collection of the Liberty University electronic library. Publication in a peer-reviewed journal will also be pursued by the project leader.

## DNP Essentials

The Doctor of Nursing Practice (DNP) scholarly project is a required component of the DNP curriculum that provides the opportunity for the DNP student to achieve professional goals (Moran et al., 2017). Successful completion of the DNP scholarly project also prepares the DNP student to begin scholarly practice (Moran et al., 2017). This project, as a final step in the process of doctoral education, met the following DNP essentials discussed below.

### *Essential I: Nursing Science and Theory: Scientific Underpinnings for Practice*

The project leader demonstrated DNP Essential I by applying a scientific method to research the phenomenon of interest. Analysis of the studies included in this review also required analytical knowledge, an important underpinning of scientific knowledge in nursing (Zaccagnini & White, 2017). Research synthesis is crucial for the provision of evidence-based practice (Cooper, 2010).

### *Essential II: Systems Thinking, Healthcare Organizations, Global Health, and the Advanced Practice Nurse Leader*

By examining the impact of delirium protocols and approaches on the outcomes of falls in older hospitalized adults, the project leader demonstrated DNP Essential II. Additionally, DNP Essential II was met through the evaluation of the sustainability of quality improvement initiatives addressing delirium.

### *Essential III: Clinical Scholarship and Evidence-Based Practice*

The project leader demonstrated DNP Essential III by researching and analyzing data from clinical practice. Identifying gaps in research and gaps in the practice of implementing delirium protocols further exhibited DNP Essential III. In the future, the project leader may pursue implementation of a delirium protocol to decrease falls at an acute care hospital.

### *Essential IV: Information Systems/Technology and Patient Care Technology for the Improvement and Transformation of Health Care*

Completing this integrative review required computer skills and knowledge of conducting online research; both are components of DNP Essential IV. Zaccagnini and White (2017) noted that DNP Essential VI involves critical evaluation of information assessed through multiple sources; this was demonstrated by the utilization of three reliable online library databases and the selection of final articles for this study.

### *Essential V: Healthcare Policy for Advocacy in Health Care*

By critically analyzing the impact of delirium protocols from a position of advocacy for older adults and nursing professionals, the project leader has exhibited DNP Essential V. Presentation of the results of the research also manifested DNP Essential V (Chism, 2016).

### *Essential VI: Interprofessional Collaboration for Improving Patient and Population Health*

Collaboration with a librarian occurred during the literature search phase of this project. Advice and feedback from the project chair were sought and received throughout the process of completing this review. This demonstration of DNP Essential VI served to ensure this review would provide valid evidence that can be applied to improve outcomes of hospitalized older adult patients. This project was originally planned to be an implementation project for the DNP practicum clinical site (a rural acute care hospital) and may be pursued as such in the future.

### *Essential VII: Clinical Prevention and Population Health for Improving the Nation's Health*

According to Zaccagnini and White (2017), the DNP possesses the expertise to pinpoint strategies that improve clinical outcomes within care delivery models. The project leader addressed DNP Essential VII by determining the effectiveness of delirium protocols and approaches on fall outcomes among older adults in acute care settings. Additionally, mastery of DNP Essential VII was validated by the inclusion of implications for practice with regard to preventing falls through delirium management.

## Conclusion

The evidence indicates that prevention, identification, and management of delirium lowers patient fall rates in older adults. Given the frequency of delirium among the older adult population in acute care settings and the link between delirium and falls, it is crucial for hospitals to institute and maintain an effective multicomponent, multidisciplinary delirium protocol. Educational support and resources for delirium training and consistent delirium management are essential for successful implementation and sustainability of any delirium protocol. More research is necessary regarding the impact, feasibility, and cost-effectiveness of delirium protocols, particularly protocols that must be modified in resource-poor settings.

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## Appendix A: Strengths of Evidence Table

| Article Author/Year | Study Purpose/ Objectives | Design Sampling, Method, & Subjects | Level of Evidence | Interventions & Outcomes | Results | Study Strengths & Limitations |
|---|---|---|---|---|---|---|
| Babine, R. L., Farrington, S., & Wierman, H. R. (2013). HELP prevent falls by preventing delirium. *Nursing2013*, e.18-e.21. https://doi.org/10.1097/01.NURSE.0000428710.81378.aa | To compare and describe delirium identification, documentation, and outcomes of two patient samples. | Quasi-experimental. 158 patients older than 70 years identified as being at risk for falls in a 24-bed medical telemetry unit | Level III quasi-experimental | HELP program. Outcomes: falls. | Falls decreased from a rate of 5.15 per 1,000 patient days to 2.49 per 1,000 patient days. | Strengths: level III study<br>Limitations: The delirium rate may have been underestimated and the study was resource intensive |
| Babine, R. L., Hyrkas, K. E., Hallen, S., Wierman, H. R., Bachand, D. A., Chapman, J. L., Fuller, V. J. (2018). Falls and delirium in an acute care setting: A retrospective chart review before and after an organization-wide interprofessional education. *Journal of Clinical Nursing*, *27*(7–8), e1429–e1441. https://doi.org/10.1111/jcon.14259 | To determine if the Hospital Elder Life Program (HELP) delirium prevention resulted in fall prevention. | Non-randomized pre-post-design. 637-bed tertiary teaching Magnet hospital; 206adult patients with mean age of 66.8 years in first review and 64.2 in second review, most common primary medical diagnoses were cancer, vascular disease, pulmonary disease | Level III, quasi-experimental study | Organization-wide interprofessional education on delirium. Outcomes: identification, management, documentation of delirium, falls. | The organization-wide interprofessional education on delirium improved staff ability to identify, manage and document delirium. The rate of fall also decreased. | Strengths: level III study<br>Limitations: Data was collected at two different intervals; pediatric patients were excluded |
| Blair, A., Anderson, K., & Bateman, C. (2018). The “golden angels”: Effects of trained volunteers on | To determine if a volunteer program for patients with dementia, delirium, or | Quasi-experimental. 458 adults older than 65 years from 7 rural acute | Level III, quasi-experimental | Volunteer program for patients with dementia, | Readmission rates were lower for the intervention | Strengths: study included 7 hospitals, level III study |

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| specialling and readmission rates for people with dementia and delirium in rural hospitals. *International Psychogeriatrics*, *30*(11), 1707–1716. https://doi.org/10.1017/S1041610218000911 | at risk for delirium results in better outcomes. Non-randomized, controlled trial. | care hospitals in Australia | | delirium, or at risk for delirium. Outcomes: readmission rates, mortality rates, length of stay, falls, pressure ulcers. | group, no differences in mortality, longer LOS in intervention group, no difference in falls or pressure ulcers. | Limitations: Data on nutrition and hydration was limited, lack of randomization, lack of blind data collection. |
| Bond, P., & Goudie, K. (2015). Identifying and managing patients with delirium in acute care settings. *Nursing Older People*, *27*(9), 28–32. | To determine if a delirium toolkit (the 4AT and the TIME delirium care bundle) improves delirium outcomes. . | Pilot study, non-randomized. Convenience sample in acute hospital settings across Scotland, 95 % of adult patients over the age of 65 | Level III, quasi-experimental | Utilizing the 4AT and TIME delirium bundle for older adult patients. Outcomes: length of stay, fall rates | More patients assessed for delirium, length of stay and fall rates decreased. | Strengths: level III study across multiple hospitals Limitations: Data missing such as exact number of patients. |
| Dean, E. (2012). Reducing falls among older people in hospital. *Nursing Older People*, *24*(5), 16, 18–19. https://doi.org/10.7748/nop2012.06.24.5.16.c9114 | To describe the results of the FallSafe project in reducing falls in older hospitalized adults. | QI study, non-randomized. 16 wards at South Central Strategic Health Authority in England from 2010-2012; 20 patient records on each ward monthly (7.680 total) | Level III; quasi-experimental | Implementing the FallSafe project that includes a delirium screening tool. Outcome: fall rates. | Falls were reduced by 25% on average across the 16 wards. | Strengths: Level III study involving 4,608 patients Limitations: There is a possibility that falls were under-reported, number of falls not given. |
| Ferguson, A., Uldall, K., Dunn, J., Blackmore, C. C., & Williams, B. (2018). Effectiveness of a multifaceted delirium screening, prevention, and treatment initiative on the rate of delirium falls in the acute care setting. | To determine the effectiveness of a multifaceted delirium program on fall rates. | Retrospective cohort study, nonrandomized. 336 tertiary care hospital and included critical care, step-down, telemetry, medical-surgical, observation, and inpatient rehab units. Mean age of patients was 67.5 yrs preintervention | Level III, quasi-experimental | Implementation of a multifaceted delirium program (screening, prevention, treatment). Outcomes: fall rates. | Delirium falls decreased postintervention from 0.75 per thousand patient days to 0.50 falls per patient days. Overall hospital falls | Strengths: level III study over 6 years Limitations: Chart reviews were used to determine the diagnosis of delirium; inability to confirm the effectiveness of individual interventions in |

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| *Journal of Nursing Care Quality*, *33*(3), 213–220. https://doi.org/10.1097/NCQ.0000000000000297 | | and 68.1 yrs post. All patients admitted from January 2011 to January 2017 were included. Total number of participants was 7,154. | | | also decreased from 2.58 to 2.03 falls per 1,000 patient days. | preventing falls; hospital unit staffing increased through the course of intervention. The program's effects on LOS and hospital costs were not measured. |
| Flaherty, J. H., & Little, M. O. (2011). Matching the environment to patients with delirium: Lessons learned from the Delirium Room, a restraint-free environment for older hospitalized adults with delirium. *The American Geriatric Society*, *59*(S2), S295–S300. https://doi.org/10.1111/j.1532-5415.2011.03678.x | To evaluate the effectiveness of the Delirium Room (DR) Model. | Non-randomized longitudinal study. Two hospitals with Acute Care for Elders (ACE) units that provide 24-hr nursing care; older adult patients were placed in a 4-bed Delirium Room; 148 participants. | Level III; quasi-experimental | Implementing a DR Model in an ACE unit for older adult patients with delirium. Outcomes: fall rates, length of stay, deaths. | Fall rate was lower in the ACE unit with the Delirium Room than on general medical-surgical floors; no significant differences regarding length of stay and number of deaths. More cost effective than private sitters. | Strengths: level III study<br>Limitations: Falls data limited to one hospital and were not analyzed to control for confounding variables; unclear which aspect of the Delirium Room positively affected outcomes. |
| Fox, M. T., Persaud, M., Maimets, I., O'Brien, K., Brooks, D., Tregunno, D., & Schraa, E. (2012). Effectiveness of acute geriatric unit care using Acute Care for Elders components: A systematic review and meta-analysis. *Journal of American Geriatric Society*, *60*(12), 2237–2245. | To compare outcomes of care provided by the Acute Care for Elders (ACE) model to usual care. | Systematic review and meta-analysis of 13 RCT's and quasi-experimental trials of parallel comparison groups in acute geriatric care units and nongeriatric units. Total number of participants was 6,839. | Level I; systematic review with meta-analysis | Application of the ACE model for older hospitalized adults. | Less falls, less delirium, less functional decline at discharge, shorter LOS, fewer discharges to a nursing home in the ACE units. | Strengths: level I study with 13 RCT's<br>Limitations: Risk of bias, secondary source |

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| https://doi.org/10.1111/jgs.12028 | | | | | | |
| Gonski, P. N., & Moon, I. (2012). Outcomes of a behavioral unit in an acute aged care service. *Archives of Gerontology & Geriatrics*, *55*(1), 60–65. https://doi.org/10.1016/j.archger.2011.06.013 | To review outcomes of patients in a unit that specializes in management patients with delirium and/or dementia. | Retrospective chart review. 10-bed intensive secure unit; 41 patients aged 59 to 95 with an average of 83.1 years, 56% females; 40 had a diagnosis of dementia | Level III, quasi-experimental . | Specialty unit for delirium patients. Outcomes: Length of stay, fall rates, use of physical restraints | There was no improvement in length of stay when compared to a general ward, the rate of falls was lower than among patients with dementia or delirium on general floors, no physical restraints were used. | Strengths: level III study Limitations: Small sample size; subjects were not matched for factors like acuity, co-morbidities, or severity of behavioral problems; limitations with questionnaires; number of falls for comparison not given. |
| Hirsch, C. (2015). Multicomponent nonpharmacologic interventions reduce incident delirium in inpatients [Review of the article "Effectiveness of multicomponent nonpharmacological delirium interventions: A meta-analysis," by T. T. Hshieh, J. Yue, E. Oh, M. Puelle, S. Dowal, T. Travison, & S. K. Inouye]. *Annals of Internal Medicine*, *163*(2), JC4. https://doi.org/10.7326/ACPJC-2015-163-2-004 | To determine if nonpharmacologic interventions reduce incidence of delirium in inpatients. | Systematic review and meta-analysis.14 studies of 4,267 total inpatients with a duration of 3 to 36 months; median age of patients was 80, patients with terminal illness were excluded | Level I; systematic review with eta-analysis | Nonpharmacologic interventions to reduce delirium. Outcomes: delirium incidence, falls, LOS, discharges to institutions, functional status, cognitive status. | Multi-component non-pharmacologic interventions reduced the incidence of delirium and falls, but did not affect LOS, discharge to institution, change in functional status, or change in cognitive status. | Strengths: level I study Limitations: Only 4 randomized trials were included, secondary source, some studies were only 3 months long. |

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| Hshieh, T. T., Yang, T., Gartaganis, S. L., Yue, J., & Inouye, S. K. (2018). Hospital Elder Life Program: Systematic review and meta-analysis of effectiveness. *The American Journal of Geriatric Psychiatry*, *26*(10), 1015–1033. https://doi.org/10.1016/j.jagp.2018.06.007 | To sum up the effective-ness of Hospital Elder Life Program (HELP) on delirium outcomes. | Systematic review with meta-analysis. 3,605 older adult hospital patients in 44 studies. | Level I, systematic review with meta-analysis | HELP program. Outcomes: delirium incidence, falls, hospital stay costs, LOS, rate of institutionalization. | The HELP program reduced delirium incidence, falls, and hospital costs. There was also a trend towards decreasing LOS and rate of institutional-ization. | Strengths: level I study Limitations: There were a limited number of studies for meta-analysis of falls, institutionalization, and functional & cognitive change. There was high heterogeneity. Some studies included were single-site studies with potentially limited internal/ external data. |
| Hshieh, T. T., Yue, J., Oh, E., Puelle, M., Dowal, S., Travison, T., & Inouye, S. K. (2015). Effectiveness of multicomponent nonpharmacological delirium interventions: A meta-analysis. *JAMA Internal Medicine*, *175*(4), 512–520. https://doi.org/10.1001/jamainternmed.2014.7779 | To evaluate the effects of multicomponent nonpharmacological delirium interventions on delirium outcomes. | Systematic literature review with meta-analysis. 14 interventional studies were analyzed that included 4267 patients in 12 acute surgical and medical wards in academic and community hospitals | Level I, systematic review with meta-analysis | Multi-component nonpharmacological delirium interventions. Outcomes: fall rate, LOS, rate of institutionalization. | Fall rate was decreased in the intervention group, shorter LOS in the intervention group, rate of institutionaliza tion was less in the intervention group. | Strengths: level I study Limitations: Less than a third of studies included were RCT's, some data may have been limited due to inability to achieve blinding, some selective reporting bias may exist. |
| Jones, L., & Taylor, T. (2019). Identifying acute delirium on acute care units. *Medsurg Nursing*, *28*(3), 172-175, 187. | Implement delirium screening and decrease falls, use of safety sitter, and length of stay in an acute care hospital unit. | QI study, nonrandomized. 186 English-speaking patients age 18 and older with mean age of 79 on ortho-surgical unit | Level III, quasi-experimental | Delirium screening. Outcomes: falls, use of sitter, LOS. | Falls were decreased, safety sitter use was increased, and length of hospital stay was increased. | Strengths: level III study Limitations: Participants limited to ortho-surgical unit. |

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| Krall, E., Close, J., Parker, J., Sudak, M., Lampert, S., & Colonnelli, K., (2012). Innovation pilot study: Acute care for elderly (ACE) unit—Promoting patient-centric care. *HERD: Health Environments Research & Design Journal*, *5*(3), 90–96. | To pilot the interventions of an ACE unit staffed with Geriatric Resource Nurses (GRNs) for confused older adult hospitalized patients. | Quasi-experimental EBP pilot study.<br>Hospital in a Southern California retirement community; 365 adults age 65 and older place in the 6-bed acute care ACE unit (intervention unit), with 90 similar patients on a medical-surgical group in the control group. Average age 82.5 on ACE unit and 82.5 on med-surg floor. Total of 435 participants. | Level III, quasi-experimental | ACE unit staffed with GRN's. Outcomes: restraint use, LOS, UTI rates, catheter use, falls, pressure ulcers, functional level | Restraint use in the ACE unit, LOS, UTI rates, catheter use, fall rates, and pressure ulcers were lower in the ACE unit (intervention group). Functional level was higher in the ACE group. | Strengths: level III study<br>Limitations: Single site study only over 3 months, limited number of participants esp. in the control group. |
| Laws, D., & Crawford, C. L. (2013). Alternative strategies to constant patient observations and sitters. *Journal of Nursing Administration*, *43*(10), 497–501. https://doi.org/10.1097/NNA.0b013e3182a3e83e | To decrease the use of sitters while increasing safety by addressing delirium risks, screening interventions. | QI project, nonrandomized.<br>173-bed acute hospital in northern California | Level III, quasi-experimental; primary source | Delirium risk identification, delirium screening, delirium management. Outcomes: sitter use, falls | The use of sitters was reduced by 20%, patient outcomes were improved, decrease in falls with major injury or death. | Strengths: level III study<br>Limitations: Limited to one setting, some data missing such as some of the fall rates prior to intervention and number of participants. |
| Loftus, C. A., & Weisenfield, L. A. (2017). Geriatric delirium care: Using chart audits to target improvement strategies. *Canadian Geriatrics Journal*, *20*(4), 246–252. | To determine and prioritize effective interventions for delirium care. | Retrospective observational study with historical control done via chart audits. 186 charts of older adults in a general internal medicine unit with a focus on caring for adults age 65 and older and a heterogeneous post- | Level IV; observational study | Compare effectiveness of delirium interventions. Outcomes: adherence to delirium management practices, fall rates | Delirium is under-recognized and poor adherence exists for best delirium practices; no difference in fall rates in the | Strengths: 186 charts reviewed.<br>Limitations: Single site study. The study was a retrospective chart review rather than patient assessment in real time; thus, cases of |

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| https://doi.org/10.5770/cgj.20.276 | | surgical unit in a 418-bed academic hospital in Toronto, Ontario. Average age 69.5, 57% female | | | different groups. | delirium may have been missed. |
| Mudge, A. M., Maussen, C., Duncan, J., & Denaro, C. P. (2013). Improving quality of delirium care in a general medical service with established interdisciplinary care: a controlled trial. *Internal Medicine Journal*, *43*(3), 270–277. https://doi.org/10.1111/j.1445-5994.2012.02840.x | Implement delirium guidelines to decrease incidence & duration, of delirium and improve outcomes in general medicine patients with delirium. | Quasi-experimental, non-randomized with control group. Adults in 4 general medical wards in a large metropolitan teaching hospital in Australia age 65 and older with anticipated stay of 3 days or more, English speaking only, no psychiatric illness. The intervention group had 62 participants and the control group had 74. Mean age was 82.3 in control group and 79.6 in intervention group. 31 were from residential aged care facilities. Total participants was 206. | Level III, quasi-experimental study | Delirium guidelines. Outcomes: falls, inpatient mortality, LOS. | 22% had delirium upon admission and 44% were at risk. Falls and inpatient mortality were decreased in the intervention group, yet LOS was increased in the intervention group. | Strength: level III study Limitations: Single-site study, small sample, short study (4 months), duration of delirium could not be assessed in some of the participants |
| Ogawa, A., Okumura, Y., Fujisawa, D., Takei, H., Sasaki, C., & Hirai, K. (2019). Quality of care in hospitalized cancer patients before and after implementation of a systematic prevention program for delirium: The DELTA exploratory trial. *Supportive Care* | To determine if the Delirium Team Approach (DELTA) Program would improve quality of care in Hospitalized Cancer patients. | Retrospective before-and-after study. 4180 patients in pre-intervention period and 3797 patients in post-intervention period; participants were admitted to the National Cancer Center Hospital Eastin Kashiwa City, Japan, reimbursed by public health insurance, not admitted to palliative | Level III, quasi-experimental design | DELTA program. Outcomes: falls, benzo use, LOS, hospital stay costs | Several clinical outcomes were improved; the number of falls were decreased, prescription for benzos decreased, length of stay decreased, and | Strengths: level III study, large number of participants. Limitations: Unmeasured cofounders may have affected results, since it was not a RCT. The delirium assessments were done via chart review, and study was limited to one facility. |

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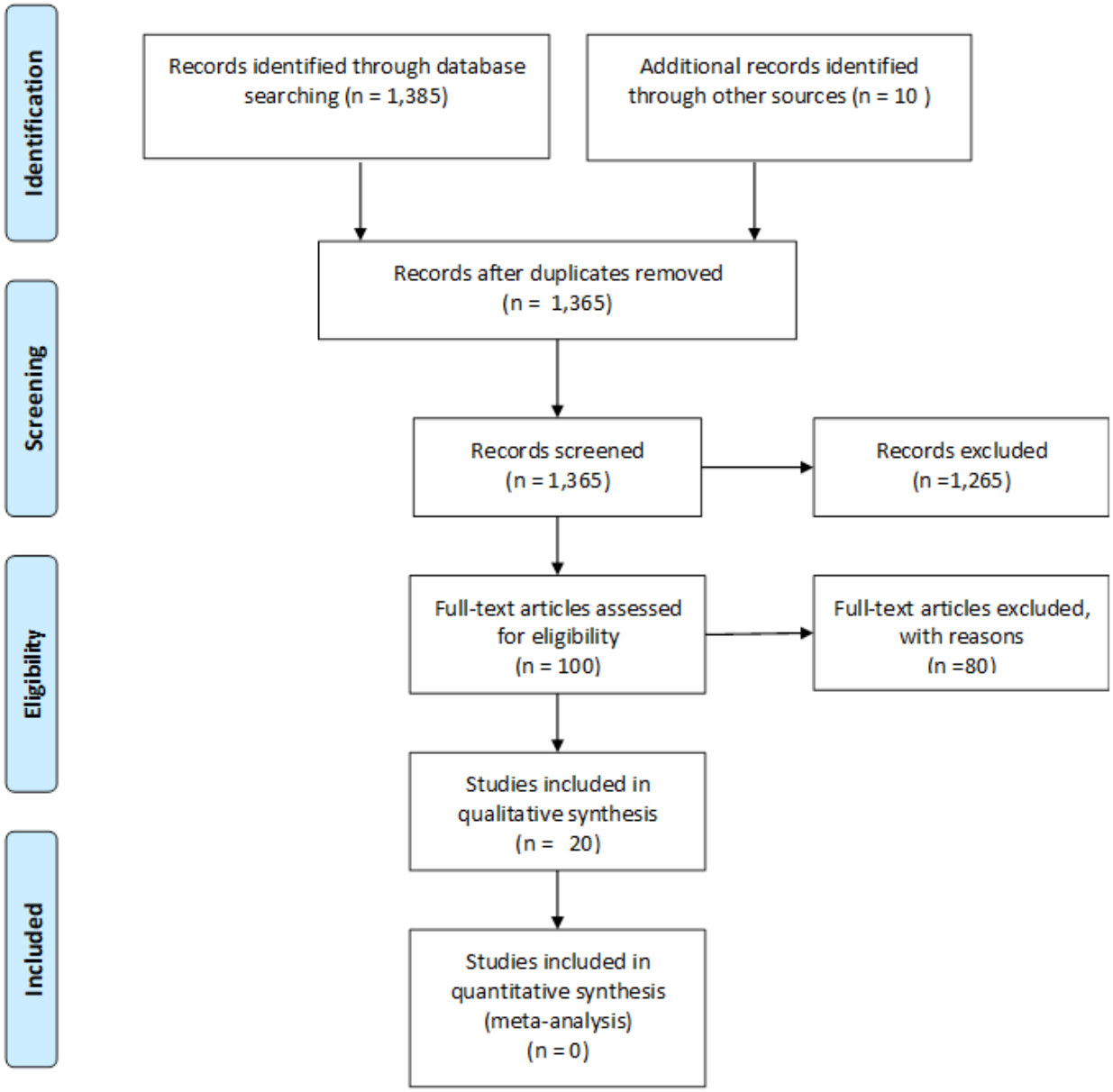
| *in Cancer*, *27*(2), 557–586. https://doi.org/10.1007/s00520-018-4321-8 | | ward, alive at least 24 hours after admission. | | | cost of hospital stay decreased. | |
| Pérez-Zepeda, M. U., Gutiérez-Robledo, L. M., Sánchez-Garcia, S., Juárez-Cedillo, T., Gonzalez, J. J. G., Franco-Marina, F., & García-Peña, C. (2012). Comparison of a geriatric unit with a general ward in Mexican elders. *Archives of Gerontology & Geriatrics*, *54*(3), e370–e375. https://doi.org/10.1016/j.archger.2011.05.028 | To assess the effects of geriatric services on elderly hospitalized patients. | Prospective cohort-matched study. 2 groups of hospitalized adults age 60 and older in 2 Mexico City hospitals; one unit was a 20-bed general ward and the other was a 50-bed general ward. Total number of participants was 210. | Level III; quasi-experimental | Specialized geriatric services. Outcomes: functional status, pressure ulcers, mortality rates, falls | Results: Patient outcomes such as functional decline, pressure ulcers, in-hospital mortality rates were better in the geriatric evaluation and management unit (GEM) than in an internal medicine ward. | Strengths: level III study with matched cohort Limitations: Results could only be generalized for only a percentage of elderly hospitalized patients. No falls occurred in either group; unable to determine from this study if intervention would decrease fall rate. |
| Toye, C., Kitchen, S., Hill, A., Edwards, D., Sin, M., & Maher, S. (2017). Piloting staff education in Australia to reduce falls in older hospital patients experiencing delirium. *Nursing and Health Sciences*, *19*(1), 51–58. https://doi.org/10.1111/nhs.12300 | To evaluate if staff education regarding delirium and falls decreases fall rates. | Quasi-experimental pre-test, post-test pilot study. 30-bed ward; 7 doctors, 7 allied health practitioners, 45 nurses participated. Patients aged 65 and older were included for 2 audit days unless unconscious or unable to speak English; 9 patients in study. | Level III, quasi-experimental | Staff education. Outcomes: delirium detection, falls | Delirium detection improved, the intervention was deemed feasible, the number of falls was reduced. | Strengths: level III study Limitations: The small group participating in delirium education, staff attrition, lack of instruction for use of a delirium assessment tool; the number of falls vs fall rates was provided. |

## Appendix B: PRISMA 2009 Flow Diagram




*Note.* Adapted from Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA statement, by D. Moher, A. Liberati, J. Tetzlaff, & D. G. Altman, *PLoS Med 6*(7), Article e1000097. https://doi.org/101371/journal.pmed.1000097

## Appendix C: Comparison of Studies

| Study | Protocol | Participants | Impact on Falls |
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| Babine et al. (2013) | HELP, CAM | 158 | Reduced from 5.15 to 2.49 per 1,000 patient days |
| Babine et al. (2018) | HELP, CAM | 206 | Reduced from 2.81 to 2.16 per 1,000 patient days |
| Blair et al. (2018) | Golden Angels Volunteer Program, CAM | 458 | 0.013 falls/LOS |
| Bond & Goudie (2015)* | 4AT and TIME Delirium Bundle | | |
| Dean (2012) | FallSafe Bundle | 7,680 | 25% reduction (no number given) |
| Ferguson et al. (2018) | HELP, CAM | 7,154 | Reduced from 0.75 to 0.50 per 1,000 patient days |
| Flaherty & Little (2011) | Delirium Room within an ACE Unit, CAM | 148 | Reduced from 5.3 to 3.7 per 1,000 patient days |
| Fox et al. (2012) | ACE Unit | 6,839 | Risk ratio 0.51 for falls (no number given) |
| Gonski et al. (2012) | Behavioral Unit for Aged Care | 41 | 6 falls (no comparison given) |
| Hirsch (2015) | HELP | 4,267 | Reduced from 12.9 to 4.3 per 1,000 patient days |
| Hshieh et al. (2018) | HELP, CAM | 3,605 | Reduced from 58 to 23 |
| Hshieh et al. (2015) | HELP, CAM | 4,267 | Reduced from 95 to 24 |
| Jones & Taylor (2019) | CAM | 186 | Reduced from 8 to 7 |
| Krall et al. (2012) | ACE Unit with GRN | 435 | 0 compared to 6 in control group |
| Laws & Crawford (2019)* | Risk factor table, delirium tip sheet, lightning round questions | | Reduced from 0.47 to 0 per 1,000 patient days |
| Loftus et al. (2017) | CAM, NICHE training, GRN | 186 | 2 (no difference from control) |
| Mudge et al. (2013) | Multi-component delirium protocol, CAM | 206 | Reduced from 6 to 4 |
| Ogawa et al. (2019) | DELirium Team Approach (DELTA), CAM | 7,977 | Reduced from 160 to 136 |
| Perez-Zepeda et al. (2012) | GEM, CAM | 210 | 0 (0 in comparison group) |
| Toye et al. (2017) | CAM, staff education program | 9 | Reduced from 9 to 3 |

*Note:* Blanks indicate missing data. HELP = Hospital Elderly Life Program; CAM = Confusion Assessment Method; 4AT = Alertness, Abbreviated Mental Test, Attention, Acute Change or fluctuating course; TIME = Think, Investigate and Intervene, Management Plan, Engage and Explore; ACE = Acute Care for Elderly; GRN = Geriatric resource nurse; NICHE = Nurses Improving Care for Health System Elders, DELTA = DELirium Team Approach; GEM = Geriatric evaluation and management unit.

## Appendix D: CITI Training Certificate

CITI PROGRAM

Completion Date 21-Jan-2020
Expiration Date 20-Jan-2023
Record ID 34955904

This is to certify that:

**Shelly Thornton**

Has completed the following CITI Program course:

**Biomedical Research - Basic/Refresher** (Curriculum Group)
**Biomedical & Health Science Researchers** (Course Learner Group)
**1 - Basic Course** (Stage)

Under requirements set by:

**Liberty University**

CITI
Collaborative Institutional Training Initiative

Verify at www.citiprogram.org/verify/?w25e6ea91-c435-4ec0-b0c8-8dae1a8ff56b-34955904

## Appendix E: Institutional Review Board Letter

LIBERTY UNIVERSITY

INSTITUTIONAL REVIEW BOARD

May 14, 2020

Shelly Thornton

Rachel Joseph

Re: IRB Application - IRB-FY19-20-372 The Use of Delirium Protocols in Decreasing Falls Among Older Adults in Acute Care: An Integrative Review

Dear Shelly Thornton, Rachel Joseph:

The Liberty University Institutional Review Board (IRB) has reviewed your application in accordance with the Office for Human Research Protections (OHRP) and Food and Drug Administration (FDA) regulations and finds your study does not classify as human subjects research. This means you may begin your research with the data safeguarding methods mentioned in your IRB application.

Decision: No Human Subjects Research

Explanation: Your study does not classify as human subjects research because:

(1) it will not involve the collection of identifiable, private information.

Please note that this decision only applies to your current research application, and any modifications to your protocol must be reported to the Liberty University IRB for verification of continued non-human subjects research status. You may report these changes by completing a modification submission through your Cayuse IRB account.

If you have any questions about this determination or need assistance in determining whether possible modifications to your protocol would change your application's status, please email us at irb@liberty.edu.