CONSCIOUS SEDATION MEDICATIONS AND RISK OF PATIENT FALLS: 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

Tricia Ginger Stevens

Liberty University

Lynchburg, VA

July, 2021

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Dr. Dorothy Murphy Date

ABSTRACT

Falls cause injury and occur at a high rate worldwide (World Health Organization, 2018). Healthcare organizations suffer from loss of reimbursement from patient falls due to the Centers for Medicare and Medicaid Services' no-pay policy. With sedation increasing the risk for patient falls, the study of conscious sedation should be performed to analyze if there is a relationship between conscious sedation and patient falls. Current knowledge regarding this topic is needed to further understand the topic at hand. An integrative review was performed to review and synthesize data. A database search was conducted with research from 2016 to 2021. CINAHL, ProQuest, MEDLINE, PubMed, and Healthsource databases were searched with following terms: "patient falls" + "sedation," "fall risk" + "sedation," "sedation falls," "procedural sedation" + "falls," and "sedation medication" + "falls." Articles were reviewed by abstract, with full article review occurring after the inclusion criteria were applied. The thematic analysis method was utilized to categorize and extract applicable data. Findings revealed five themes: age greater than 65, inappropriate medications and dosages, Pro re nata (PRN) medications, falls and fracture risk, and sedation polypharmacy. Therefore, prior to any prescription of sedation medications, risk for patient falls should be assessed. Medication should be prescribed based on evidence-based guidelines and a fall risk mitigation mindset be fostered. Findings of this review help to establish awareness for fall risks and enlighten providers to properly screen and risk-assess patients prior to prescription of sedation medications. Further research should be performed to pinpoint the post-procedural effects of conscious sedation on patient falls.

Keywords: conscious sedation, patient falls

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I would like to acknowledge my Liberty University professors for helping guide and educate me through the integrative review process. Through their knowledge and assistance, this project has come to fruition. I would also like to thank the Liberty University research librarian for her gentle guidance when I felt all hope was lost. I would also like to acknowledge my chair for this project, Dr. Dorothy Murphy, who partnered with me along this journey and helped keep me on the research path.

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Centers for Medicare and Medicaid Services (CMS)

Pro Re Nata (PRN)

SECTION ONE: FORMULATING THE REVIEW QUESTION

Introduction

The sedation of patients occurs in many locations in the outpatient and inpatient health care setting. Sedation is used to help provide comfort to patients who are undergoing difficult and painful procedures or testing. Conscious sedation is the use of medications to help relieve pain and provide an amnesia effect to the patient during these procedures. The use of conscious sedation involves the administration of the medications midazolam and fentanyl by a registered nurse or physician. Adverse effects of these medications include the risk of respiratory depression, hypotension, and bradycardia/tachycardia (Edelson et al., 2019).

The adverse physical effects of conscious sedation have been widely recognized; however, the risk of accidents and/or falls to the patient is understudied. Due to recent health care changes surrounding Centers for Medicare and Medicaid Services (CMS) reimbursement, to exercise due diligence would be to perform more investigations surrounding this topic. Falls with injury are not reimbursed by CMS to the healthcare provider. With the health care setting revolving around reimbursement-based measures and due to the frequency of conscious sedation administration, more information is needed around the effects of conscious sedation on the patient post procedure.

Background

Falls are the second leading cause of injury-related deaths around the world (World Health Organization, 2018); therefore, this phenomenon is of interest to those within the health care profession. The age of a patient can determine the risk of experiencing falls, with 28%–35% of people aged 65 and above falling yearly (Sharif et al., 2018). In the United States, an estimated 1 million hospitalized patients fall yearly (Venema et al., 2019). With 646,000

individual deaths caused by falls yearly, the need to investigate this topic is paramount to help reduce death worldwide (World Health Organization, 2018). Since those who suffer a fall seek hospital care, the health care organization is at the forefront of helping to identify and reduce potential causes of risk. With health care outcomes related to patients, health care organizations, and finances, this topic of interest should be further investigated.

Patient falls are of great importance to the health care organization due to the incidence of physical harm and the lack of reimbursement the organization receives when falls occur. Patient falls occur for many reasons, and there has been a vast amount of research performed to help mitigate patient falls within the health care organization. Patient falls within the inpatient setting of the United States have a 30%–50% chance of resulting in potential injury (The Joint Commission, 2015). With the potential for poorer health care outcomes tied to patient falls, the health care organization has a responsibility to investigate all areas of interest regarding this topic.

Patient falls have been linked to poor outcomes individually, organizationally, and financially. The patient that falls within the hospital can experience injury, worsening clinical prognosis, pain, and long-term physical disability (de Freitas Luzia et al., 2018). When the patient falls, they are at a higher risk for longer stay within the health care organization and therefore a higher cost of care (de Freitas Luzia et al., 2018). With an increased length of stay related to poorer patient outcomes and increased mortality risk, fall prevention measures should be implemented in every aspect of care (Lingsma et al., 2018). Organizationally, patient falls task the health care organization due to increased length of stay, decreased compensation, and compromised patient care. With the potential for litigation, injury, or death, as well as increased costs, the health care system must make preventing patient falls a priority (The Joint

Commission, 2015). Financially, the health care organization is estimated to spend approximately $14,000 on each fall with injury (The Joint Commission, 2015). The CMS no-pay policy was created to hold health care organizations accountable for patient outcomes and was designed to restrict Medicare reimbursement to institutions whose patients incurred costs from falls (Fehlberg et al., 2018). With the increase in health care costs and the CMS no-pay policy, more information should be reviewed and studied to provide a knowledge base for future patient outcomes related to falls.

Studies have focused on specific risks for patient falls and have highlighted an increased risk with certain medications (de Ruiter et al., 2020; Wedmann et al., 2019). Medications that are known to increase the risk of patient falls in the inpatient setting are psychologic and sedative medications. Sedative medication research related to falls has revolved around benzodiazepines and sleep-inducing medications. Specific benzodiazepine use in the form of procedural sedation has been identified as a potential topic of interest.

Procedural sedation is utilized in the hospital setting for many different procedures and occurs in the intensive care units, endoscopy, interventional radiology, cardiac catheter labs, and other ancillary cardiac units. Procedural sedation is also utilized in the outpatient setting within such areas as endoscopy, oral surgery, dentistry, and other procedural areas. Procedural sedation is given to patients on a daily basis, and the effect of sedation in relation to patient falls is a possible area of study. With the frequency of procedural sedation administration, it is important to study this specific area of interest to provide a greater knowledge base for the future.

Procedural sedation is classified as conscious sedation or deep sedation. Conscious sedation is given to provide comfort and pain relief during an uncomfortable procedure and allows the patient to maintain their own airway while also being a reversible medication. Deep

sedation is given to sedate a patient so there is no knowledge that the procedure occurred and runs the risk of airway collapse. The purpose of this integrative review is to synthesize knowledge of conscious sedation in relation to patient falls.

The medications that are commonly administered for conscious sedation are midazolam along with fentanyl. Midazolam and fentanyl have different rates of renal clearance (Mandel et al., 2017). Those patients who undergo conscious sedation can have a lingering effect of imbalance post-procedure (Mandel et al., 2017). Patients with previously low fall risk status, after conscious sedation, may need increased fall risk interventions to prevent post-procedural falls. The patients who have the highest risk of post-procedural medication effect of imbalance are those receiving midazolam and fentanyl during conscious sedation (Mandel et al., 2017).

With the information regarding risk of falls related to conscious sedation from Mandel et al., (2017), more research was recommended to be performed to investigate and synthesize knowledge regarding this topic. To perform due diligence is to investigate the effect of procedural conscious sedation on patients, which may result in changes and interventions applicable to the future of health care. As patient falls are under the CMS no-pay policy, this topic should be investigated and has pertinence to the health care profession. As with all safety topics, fall risk information should be investigated to protect patients, help to improve patient outcomes, and increase the quality of care patients receive in the health care environment.

Defining Concepts and Variables

The concepts and variables that will be dealt with during this discussion are patient falls and procedural sedation. Conceptually, a patient fall is defined as when a patient is unintentionally moved from a vertical position to a horizontal position with or without injury and with or without assistance. The operational definition includes staff-, patient-, or visitor-

identified falls. Another concept of interest is procedural sedation. Procedural sedation is conceptually defined as the administration of medications for the goal of patient comfort during procedure. The operational definition is the administration of Versed and fentanyl, also known as conscious sedation, observed under the medication reconciliation.

Definition of Terms

Psychotropics – Any substance that affects behavior, mood, and thoughts.

Z-drugs – Drugs that are non-benzodiazepine classed hypnotics that cause fewer sedative properties than regular benzodiazepines.

BEERS criteria – A guideline for healthcare providers to use when prescribing medications to older adults.

Rationale for Conducting the Review

With any clinical question, it is important to look at the information already published to help refine and support the area of interest. Knowing what experts in the field of study have found can also help to enlighten the scholar on gaps that still need to be addressed. Reviewing the known research can help to give backing to the current research and provide opportunities for the researcher to translate this knowledge into practice. A thorough literature review was needed to review the current information surrounding conscious sedation and patient falls.

Research surrounding procedural sedation is multifaceted regarding the pathophysiologic influence of these medications on the patient. Risks of procedural sedation such as depressed respiratory rate and effort (Clark & Collins-Yoder, 2020; Nichols et al., 2018), oxygen desaturation, vomiting, and transient apnea (Nichols et al., 2018) are well documented in the current research. However, what information has been published regarding the safety concerns of patient falls regarding conscious sedation?

Patient fall research currently consists of investigations into risks for patient falls related to medications, such as sedatives (Berry et al., 2016; Cox et al., 2015; Mandel et al., 2017; Seppala et al., 2018; Skinner et al., 2017); increased cost related to falls (Burns et al., 2016; Stevens & Lee, 2018); and nursing interventions to decrease falls (Chu, 2017; Kowalski, 2017; Vonnes & Wolf, 2017; Wilson et al., 2016). Those within the health care organization are interested in the research, as this topic relates to every patient within their walls. There is only one study that mentioned the effects of procedural sedation on the patient's ability to ambulate; however, the study stated more information was needed on the topic (Mandel et al., 2017). To find out more information and evaluate the current research on this broad topic, an integrative review was needed to synthesize the findings. The integrative review format was chosen to help meet the goal of this study.

Purpose and Review Question

The purpose of this integrative review is to analyze the research that has been completed on conscious sedation and patient falls and synthesize the findings across the studies. The following question is to be addressed during this review: Is there any association between conscious sedation and patient falls?

Inclusion and Exclusion Criteria

Based on the background provided by the information identified, specific inclusion and exclusion criteria were formed. Inclusion criteria included descriptive and experimental studies with adults aged 18 and over as the population of interest. Studies were included if the area of interest was sedation or patient falls. Studies that included inpatient and outpatient populations were included in this review. Only studies that were printed in the English language were used for this integrative review. Based on Melnyk's levels of evidence, articles that were analyzed and

identified as Level VII expert opinions were excluded (University of Michigan, 2021). Articles that focused on pediatric patients were also excluded.

Conceptual Framework

The conceptual framework utilized for this integrative review was the Whittemore and Knafl (2005) framework. The integrative review allows for diverse methodologies to help explore the context, elements, and processes of a chosen topic (Whittemore & Knafl, 2005). This framework provides the ability to reproduce methodology, thus providing rigor. This framework also allows for the ability to utilize qualitative and quantitative research toward the same purpose of synthesis of research.

The steps necessary to replicate the integrative review involve utilizing the thematic analysis method. The thematic analysis method involves a six-phase process including familiarizing oneself with the research, coding, searching for themes, reviewing themes, defining/naming themes, and producing a report (Toronto & Remington, 2020). This method helps to pull together all different aspects of literature regardless of specific methods. By keeping the question/aim of the study as a priority, the identification of themes can occur (Toronto & Remington, 2020). Through the detailed steps of the thematic analysis and replicable discussion of theme identification, rigor will be increased and bias will be minimized.

SECTION TWO: COMPREHENSIVE AND SYSTEMATIC SEARCH

Search Organization Reporting Strategies

Journal articles were obtained by searching through Liberty University's Jerry Falwell Library and by searching specific databases such as CINAHL, Healthsource-Nursing/Academic edition, and MEDLINE. Specific filters were applied to the search, such as articles with full text, articles published within the last five years, and articles published in the English language.

ProQuest and PubMed were also searched using their own websites, and information was sorted to include only full-text articles, articles published within the last five years, articles published in the English language, and scholarly articles. Articles were then reviewed for inclusion based on the title/topic and the abstract information. Once an article passed through this process, it was stored and reviewed in its entirety for inclusion into the study. Duplicate articles were rejected, and two articles were also rejected as they were found to be in German with only the abstract appearing in the English language. Lastly, one journal article was rejected as it was not found to be a research article.

Terminology

The review of literature was conducted by using key words and searching well-known research databases. Key words were used to find articles that would be of importance and use to the integrative review. Key words that were used were “patient falls” + “sedation,” “fall risk” + “sedation,” “sedation falls,” “procedural sedation” + “falls,” and “sedation medication” + “falls.” The use of the combination of terms allowed for greater accuracy of information obtained on the topic of interest and helped to narrow the search in the specified databases.

Results

After entering the date range of 2016-2021 in the search databases with the key terms, there was a total of 74,832 potential articles. The Liberty University databases allow for multiple database searches at once and automatically remove all duplicate articles. After these results were obtained, the search was narrowed by applying the filters of full-text articles and English language only. After the search was performed, there was a total of 16 articles for full-text review. A review of these articles in full revealed that nine articles matched the criteria for inclusion.

SECTION THREE: MANAGING THE COLLECTED DATA

Full text articles were stored in RefWorks, emailed, and stored in Adobe Cloud for review after the search was complete. Once articles were reviewed in full-text form, there was a citation written in APA format in a Word document for organizational purposes. The bias of each study was considered, and most bias that was found was due to low sample size. Such bias was deemed acceptable, and these studies were included in the integrative review. All literature search strategies and databases were discussed with the research librarian to reduce bias and increase rigor (Toronto & Remington, 2020).

SECTION FOUR: QUALITY APPRAISAL

Sources of Bias

The retrospective nature of studies was commonly identified as a source of bias (Arnold et al., 2017; Kim et al., 2018; Michalcova et al., 2020). Data from a year prior to the implementation of fall interventions was utilized in one study (Arnold et al., 2017). Two studies were biased due to discussions of generalized sedative/hypnotic medications without identification of specific medications (Badr et al., 2018; Ribeiro et al., 2018). One of the chosen studies was nonrandomized and unblinded (Badr et al., 2018). There was a small sample size bias in one of the articles, and data on patient medications were self-reported (Conti et al., 2017).

The utilization of sedative medications with other substances was unable to be accounted for in one study, and consistent use of medications among participants was unable to be verified, as some of the medications were utilized as on an “as needed” basis (Donnelly et al., 2017). Another source of bias in a chosen study was the inability to distinguish between greater risk of falls related to sedation medications as compared to medical conditions/diagnoses (Kim et al., 2018). The chart review method was utilized for the retrospective studies, which identified a

source of bias as lack of detailed documentation in organizations of the studies (Michalcova et al., 2020; Neville et al., 2020). Another study was carried out in a primary institution and diversity of locations was identified as a bias (Ribeiro et al., 2018). Lastly, one article identified the small number of randomized controlled trials dealing with the topic of interest and the need to utilize trials (Vaismoradi et al., 2018).

Internal Validity

Included articles were reviewed for internal validity/believability of the results (Toronto & Remington, 2020). Of the articles utilized for this review, there were multiple articles that used a statistical analysis tool in their studies. Logistical analysis was performed in two studies (Arnold et al., 2017; Kim et al., 2018), with a two-tailed chi-square test performed in another study (Badr et al., 2018), and a chi-square analysis with logistic regression performed in another study (Conti et al., 2017). Statistical significance was utilized in a study to unite the findings to the results of the study with $p < 0.001$ (Donnelly et al., 2017). Two studies utilized an Excel spreadsheet to store information (Michalcova et al., 2020; Neville et al., 2020), with one of the studies using a pivot table to analyze the information (Michalcova et al., 2020).

All results of the studies were compared to the findings and reviewed. The information that was created through retrospective analysis and reviews was compared to the results/conclusions and found to be believable and applicable to practice. Information that was obtained in three of the studies was compared to overall current research on the topic and found to be similar (Donnelly et al., 2017; Neville et al., 2020; Ribeiro et al., 2018). Therefore, all nine articles were included in the integrative review after being screened for internal validity.

Appraisal Tools (Literature Matrix)

All articles were categorized using Melnyk's levels of evidence (see Appendix A). After evaluation based on Melnyk's levels of evidence, all nine articles were included in the integrative review. Despite the evidence having many different forms and styles, all articles were utilized to give a wider perspective on the topic of interest. Due to the topic of interest being related to nursing, the use of lower-quality studies in the integrative review was both appropriate and desirable (Toronto & Remington, 2020). The combination of the randomized control trials and descriptive studies provided the ability to bring a large base of knowledge to the topic at hand.

Applicability of Results

Studies included in the integrative review rated between one and six on Melnyk's level of evidence. Four of the studies consisted of Level IV evidence (Arnold et al., 2017; Conti et al., 2017; Kim et al., 2018; Michalcova et al., 2020). One of the studies was a Level III on the level of evidence scale (Badr et al., 2018). There was a total of three studies that provided Level I evidence, which is the highest ranked research level of evidence (Donnelly et al., 2017; Ribeiro et al., 2018; Vaismoradi et al., 2018). Lastly, one study was a Level VI on Melnyk's scale and is described as a descriptive study (Neville et al., 2020). To give a diverse perspective, all different levels were included to add body to the current topic.

Reporting Guidelines

To showcase the literature search process and the inclusion and exclusion maneuvers, the PRISMA diagram was utilized (see Appendix B). The PRISMA diagram provides a visual representation of the many steps needed to determine the inclusion of the final articles. The PRISMA diagram also helps to give a replicable process to give structure to the body of

knowledge. Through the use of a diagram, a large body of information can be shared in a condensed manner (Boers, 2018; as cited in Toronto & Remington, 2020).

SECTION FIVE: DATA ANALYSIS AND SYNTHESIS

Data Analysis Methods

A thematic analysis was performed on the data gathered from this review. Thematic analysis was performed utilizing the six phases of familiarization, coding, theme search, reviewing themes, definition/naming of themes, and reporting (Braun & Clark, 2006; as cited in Toronto & Remington, 2020). To perform this analysis, the author was immersed in the data and all article sections titled “results” and “conclusion” sections were reviewed. Note-taking strategies were utilized to help organize theme emergences. Through this six-phase process, common themes were identified. These themes were organized in a grid format to help visualize commonalities across the studies.

Common Themes Identified

Table 1

Common Themes in the Research

	Age > 65	Increased length of stay	Inappropriate dosage/ medication	PRN sedation	Fracture/ falls risk	Sedation polypharmacy
(Arnold et al., 2017)	X	X	X			
(Badr et al., 2018)			X	X		X
(Conti et al., 2017)	X		X		X	
(Donnelly et al., 2017)	X				X	
(Kim et al., 2018)					X	X
(Michalcova et al., 2020)	X				X	
(Neville et al., 2020)	X		X	X		X
(Ribeiro et al., 2018)	X				X	
(Vaismoradi et al., 2018)			X	X		

A review of themes was performed after the themes were categorized into a grid format. All themes that did not have at least two studies with the identified theme were discarded for potential dissemination and reporting purposes. Themes were then given a thorough description/definition and placed in a condensed grid format for visual purposes.

Condensed Themes/Definitions

Table 2

Condensed Themes with Definitions

Age > 65	Inappropriate dosage/medication	PRN sedation	Fracture risk/ fall risk	Sedation polypharmacy

Age greater than 65 years old.	Medication dosage amount greater than current evidence-based guidelines. Current medications given that are inappropriate for the patient based on the fall risk increase drug (FRID) criteria and BEERS criteria (Kenya et al., 2021).	Medications given on an "as needed basis," that is, to achieve a desired effect.	Risk for break in a bone or an unintentional fall or movement from a lateral to horizontal position.	More than one medication used concomitantly.

Five common themes within the literature were identified through the thematic analysis. All articles were familiarized with the author and immersion in the literature occurred to establish themes. Patient age of 65 or older was found to be a theme in six of the nine (66%) articles on sedation medication (Arnold et al., 2017; Conti et al., 2017; Donnelly et al., 2017; Michalcova et al., 2020; Neville et al., 2020; Ribeiro et al., 2018). A theme of inappropriate medications or dosages was found in in five of the nine (56%) studies on sedation (Arnold et al., 2017; Badr et al., 2018; Conti et al., 2017; Neville et al., 2020; Vaismoradi et al., 2018). Sedative medications classified as Pro Re Nata (PRN) was revealed as a common theme, found in three of the nine (33%) studies (Badr et al., 2018; Neville et al., 2020; Vaismoradi et al., 2018). Fall and fracture risk was a recognizable theme in five of nine (56%) of the articles on sedation (Conti et al., 2017; Donnelly et al., 2017; Kim et al., 2018; Michalcova et al., 2020; Ribeiro et al., 2018). Lastly, sedation polypharmacy was revealed as a theme in three of the nine (33%) studies (Badr et al., 2018; Kim et al., 2018; Neville et al., 2020).

Descriptive Results

Table 3

Descriptive Results of Included Studies

Authors	Title	Year	Country of origin	Methods	Conclusion(s)
Arnold, Straube, Himmel, Heinemann, Weiss, Heyden, Hummers-Pradier, and Nau	High prevalence of psychotropic drugs for older patients in a general hospital	2017	Germany	Retrospective chart review	Patients over the 65 years of age in this study were found to have a high percentage of psychotropic drug.
Badr, Kurdi, Alshehri, McManus, and Lee	Pharmacists' interventions to reduce sedative/hypnotic use for insomnia in hospitalized patients	2018	United States	Biphasic before and after study	Patients in this study were found to be on more than one sedative/hypnotic, and the use of a pharmacist's medication review helped to reduce the number of sedative/hypnotic medications among the group.
Conti, Stanley, Amspoker, and Kunik	Sedative-hypnotic use among older adults participating in anxiety research	2017	United States	Quantitative, case-controlled study	Of adults aged 53–93 in this study, 25% used sedative-hypnotics.
Donnelly, Bracchi, Hewitt, Routledge, and Carter	Benzodiazepines, Z-drugs and the risk of hip fracture: A systematic review and meta-analysis	2017	United Kingdom	Systematic review and meta-analysis	Study findings highlight evidence of an association between hypnotic medications and hip fractures. There was also an association with length of time patients used benzodiazepines and Z-drugs, with those at the highest risk being those who were first started on these medications.
Kim, Walley, Ventura, Patts, Heeren, Lerner, Mauricio, and Saitz	Polypharmacy and risk of falls and fractures for patients with HIV	2018	United States	Quantitative, longitudinal study.	Study findings show patients living with HIV have a higher risk of falls with every sedative prescription taken.

	infection and substance dependence				
Michalcova, Vasut, Airaksinen, and Bielakova	Inclusion of medication-related fall risk in fall risk assessment tool in geriatric care units	2020	Czech Republic	Qualitative, retrospective study.	Study findings showcase multiple fall-related medications were being taken within the study and were not factored into fall risk screening criteria.
Neville, Losier, Pitman, Gehrig, Isenor, Minard, Penny, and Bowles	Point prevalence survey of benzodiazepine and sedative-hypnotic drug use in hospitalized adult patients	2020	Canada	Point prevalence, qualitative study.	Findings of the study show that sedative medications were used in patients up to the age of 80. There were also findings showing the dosage of medications utilized in the elder population were not in line with current evidenced based recommendations.
Ribeiro, Melo, Maia, and Ribeiro	Medication-related inpatient falls: A critical review	2018	Brazil	Literature review	Sedative medications were found to be prescribed to 35% of the patients in Nova Scotia in a 24-hour period. Older adults were given these medications at bedtime.
Vaismoradi, Amaniyan, and Jordan	Patient safety and *pro re nata* prescription and administration: A systematic review	2018	Norway, Iran, UK	Systematic review	PRN sedative medications were found to be prescribed, and the safety profiles were not monitored/attributed to PRN medication use.

Synthesis

Synthesis of the literature around sedation medications and patient falls revealed the following themes: patient age greater than 65 (Arnold et al., 2017; Conti et al., 2017; Donnelly et al., 2017; Michalcova et al., 2020; Neville et al., 2020; Ribeiro et al., 2018), inappropriate dosage and medications (Arnold et al., 2017; Badr et al., 2018; Conti et al., 2017; Neville et al., 2020; Vaismoradi et al., 2018), PRN medication (Badr et al., 2018; Vaismoradi et al., 2018) fall and fracture risk (Conti et al., 2017; Donnelly et al., 2017; Kim et al., 2018; Michalcova et al., 2020; Ribeiro et al., 2018), and sedation polypharmacy (Badr et al., 2018; Kim et al., 2018; Neville et al., 2020). Through the rigorous data analysis, themes were identified and will be discussed more in depth below.

Age > 65

The literature showed that patient age of greater than 65 was the most discussed theme within the sedation and patient falls research, appearing in six of the nine (66%) articles (Arnold et al., 2017; Conti et al., 2017; Donnelly et al., 2017; Michalcova et al., 2020; Neville et al., 2020; Ribeiro et al., 2018). Age greater than 65 was discussed regarding medications that were administered and was distinguished from other ages in the research (Arnold et al., 2017; Badr et al., 2018; Conti et al., 2017; Michalcova et al., 2020; Neville et al., 2020). This theme aligns with current research around falls (Kenya et al., 2021).

Inappropriate Dosage and Medication

A theme of inappropriate dosage and medication was also revealed in the sedation and patient falls literature (Arnold et al., 2017; Badr et al., 2018; Conti et al., 2017; Neville et al., 2020; Vaismoradi et al., 2018). Specific medications discussed were the benzodiazepine class and Z-drug class (Arnold et al., 2017; Badr et al., 2018; Conti et al., 2017; Donnelly et al., 2017;

Michalcova et al., 2020; Neville et al., 2020; Ribeiro et al., 2018; Vaismoradi et al., 2018). Inappropriate medication dosage was a theme regarding Z-drug use and the older adult (Arnold et al., 2017; Neville et al., 2020).

PRN Medication

Many sedation medications are given on an as-needed basis. The PRN medication frequency is difficult to fully actualize and evaluate (Vaismoradi et al., 2018). Medications given as needed are not scrutinized for complications as closely as those medications given at regular intervals/frequency (Vaismoradi et al., 2018). The PRN sedation medication may influence patient falls due to infrequent, simultaneous medication administration and lack of monitoring for side effects (Vaismoradi et al., 2018). However, PRN administration was preferable to standardized bedtime prescriptions to help decrease over sedation (Badr et al., 2018).

Fall and Fracture Risk

Sedation medications increase the risk of patient falls and fractures (Conti et al., 2017; Donnelly et al., 2017; Kim et al., 2018; Michalcova et al., 2020; Ribeiro et al., 2018). Different medications have revealed an increased risk of up to 140% of fall and fracture related to the length of medication use (Donnelly et al., 2017). Fracture and fall risk can also be related to other chronic conditions that sedation medications help to treat in the patient (Kim et al., 2018).

Sedation Polypharmacy

In addition to sedation itself increasing the risk for falls, sedation polypharmacy has been shown to increase the risk of falls even further (Kim et al., 2018). Each sedation medication that is added to a patient's medication list increases the risk for falls or patient harm (Kim et al., 2018). Through a monitoring pharmacist, sedation polypharmacy can be avoided to help mitigate falls (Badr et al., 2018). Those aged 80 years old and above have been found to be less likely to

receive two sedation medications concurrently as compared younger participants (Neville et al., 2020).

Ethical Considerations

All research endeavors were completed with the approval of the Liberty University's Institutional Review Board. Prior to the study, the author applied for Institutional Review Board approval and was given permission based on the review not utilizing any human research subjects (see Appendix C). There were no conflicts of interest with this article, and no monetary compensation was received or given.

SECTION SIX: DISCUSSION

The purpose of this integrative review was to analyze and synthesize the literature surrounding conscious sedation and patient falls. Specific sources of literature addressing conscious sedation and patient falls did not emerge through the database search. This highlights the gap of knowledge relating to conscious sedation and the patient-related safety topic of falls. However, results revealed multiple articles surrounding sedation medications and fall risks. After the literature was selected and systematically reviewed, themes were identified. Themes that were identified in the research were patient age of over 65, inappropriate dosage/medications, PRN sedation, fracture/fall risk, and sedation polypharmacy.

Multiple specific medications names/classes were discussed in the literature; however, benzodiazepines and Z-drugs were the most commonly mentioned (Arnold et al., 2017; Badr et al., 2018; Conti et al., 2017; Donnelly et al., 2017; Michalcova et al., 2020; Neville et al., 2020; Ribeiro et al., 2018; Vaismoradi et al., 2018). The association between falls relating to patient's age, specific medications and dosages, PRN medication use, risk for falls and fractures, and

sedation polypharmacy reveal the applicability of the findings to future health care practices and research endeavors.

Current published literature provides information on patient falls relating to sedative medications that aligns with the results of this integrative review (Berry et al., 2016; Cox et al., 2015; Mandel et al., 2017; Seppala et al., 2018; Skinner et al., 2017). Age of greater than 65 is a published fall risk factor, with those of this age falling at a rate of 28%–35% yearly (Sharif et al., 2018). This information mirrors the result of the current study with the thematic identification of age of over 65 years old. Commonalities within the research help provide stabilization for this current integrative review and reinforce the known research.

Strengths

The strengths of this study are in the structure and rigor of the literature review process and the ability to replicate the results. Also, very well-known databases were searched, and they provided a large background of information to be searched. The detailed discussion of the data analysis step provided structure and backing to the results of the study. The inclusion of qualitative and quantitative results also provided diversity on the topic of interest. As the information in the literature review originated in multiple countries, there is also international applicability of the results discussed.

Limitations

Limitations to the study are in the presence of only one author of the integrative review. Literature inclusion and exclusion was performed by only one author to help guide the integrative review process. In the future, the assistance of a co-author will be most helpful to provide blinding and backing to the research.

The integrative review method also provided limitations in standards and guidelines of the method are still in development (Toronto & Remington, 2020). There was difficulty finding specific information on structure and framework that would help guide the process. The ability to carry out structured methods and limit bias was difficult without clear guidance and direction.

Implications for Practice/Future Work

With the information revealed in the integrative review, prescribing health care professionals should add medications to the older adult with hesitation and only after a thorough risk versus benefit assessment. Medications should be assessed for appropriateness using available criteria such as the fall risk increasing drug (FRID) classification (Michalcova et al., 2020). After assessing the potential medication based on these criteria, current evidence-based guidelines should be followed regarding the dosage of the medication.

There are many different medications and classes of sedation medications that affect the patient. Medications that are classed as benzodiazepines and Z-drugs should be monitored closely for patient fall/fracture risk, especially upon initiation of the medication. Medications given on an as-needed basis are not standardized and may interact with other scheduled medication administration. Therefore, thorough monitoring must be provided for patients receiving PRN medications, and all abnormal behaviors/side effects should be documented and reported.

Patients receiving multiple medications for sedation should be monitored closely for over sedation and risk of falls, and interventions should be initiated to help provide the lowest dosage and number of medications needed to treat the patient. Hospitals should also update their current computer-based patient falls risk assessment tools to include patients' current medication. There should be ability to screen a patient as a low fall risk initially and change the patient to a high fall

risk based on medication recently administered. By paying attention to detail, the health care organization can decrease patient falls and improve patient outcomes.

In the future, researchers should complete a retrospective study centered around patient falls and recent conscious sedation administration. This study should look in depth at information regarding conscious sedation administration specifically in the 24 hours prior to a fall and not just at the class of medications administered. A retrospective chart review will provide the information needed to carry out this study. The needed study would include inpatient data, as this information would be better able to be investigated, and these patients more likely to have a longer length of stay in the health care environment. Once this study is performed, results would be disseminated for future nursing management of the post-procedural patient.

Conclusion

Conscious sedation research is specific and targeted to adverse physical clinical effects not related to patient falls. Patients over the age of 65 who are on multiple medications should be screened using a risk versus benefit assessment prior to receiving conscious sedation. With the increased risk of patient falls and fractures with sedation medications, such measures should be undertaken. The PRN administration of medications should be followed closely based on possible interactions with scheduled medications, and all medications should be assessed for appropriateness of medication and dosage prior to administration. Finally, more research is needed regarding conscious sedation medication and patient falls.

Dissemination

Dissemination of the results of this study will be pursued via publication. Nursing journals will be contacted for goodness of fit of the integrative review, and a working relationship will be sought. An international audience will be of interest, as many included

literature articles were from diverse countries. Presentations to local health care organizations will conducted based on availability and interest. Participation at Liberty University's upcoming research week will also be sought to help guide those in the university setting.

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Appendix A: Melnyk Level of Evidence

Article Title and Author	Study Purpose	Sample	Methods	Study Results	Level of Evidence	Study Limitations	Would use as Evidence to Support a Change?
Arnold, I., Straube, K., Himmel, W., Heinemann, S., Weiss, V., Heyden, L., Hummers-Pradier, E., & Nau, R. (2017). High prevalence of prescription of psychotropic drugs for older patients in a general hospital. *BMC Pharmacology and Toxicology, 18*(1), Article 76. https://doi.org/10.1186/s40360-017-0183-0	The purpose of this study was to identify benzodiazepine and Z-drug use in the hospital among patient over 65 years of age.	2130 patient charts were studied in a regional hospital in Saxony, German from 1/01/2013 to 3/31/2013.	Retrospective chart review	There was more benzodiazepine use in surgical patients. There was a 53.9% of patients that had at least one psychotropic medication prescribed to them. There was an increased risk for longer patient stays related to psychotropic medication use.	Level IV: Retrospective cohort study.	Interventions to reduce benzodiazepine prescription were implemented after 2016 so the numbers of benzodiazepine use currently is potentially lower.	Yes. This chart review was a level IV evidence and has a large sample size. This study fits the inclusion criteria because of the topic of sedation and was included in the review.
Badr, A. F., Kurdi, S., Alshehri, S., McManus, C., & Lee, J. (2018). Pharmacists' interventions to reduce sedative/hypnotic use for insomnia in	The purpose of this study was to review and evaluate the prescription patterns of sedative and	This was a study performed in a community hospital	Biphasic before and after study.	Findings of the study showed a decrease of 25% of a total of 97 orders that were discontinued within the first	Level III: Quasi-experimental	Small sample size and non-randomized controlled trial. There were no	Yes. This study has a level III evidence and provides informatio

Article Title and Author	Study Purpose	Sample	Methods	Study Results	Level of Evidence	Study Limitations	Would use as Evidence to Support a Change?
hospitalized patients. *Saudi Pharmaceutical Journal*, *26*(8), 1204–1207. https://doi.org/10.1016/j.jsps.2018.07.010	hypnotic agents in the aim to reduce misuse of these drugs by daily pharmacy interventions.	in Massachusetts. There was a retrospective group consisting of 100 patient and 97 in a prospective intervention group.		24 hours in the pharmacist intervention group. There was also a lower number of patients on multiple sedatives/hypnotics in the intervention group. There was no noticeable difference between the retrospective and intervention group regarding falls, over-sedation or delirium.		specifications on medications and age related events in the study.	n regarding sedation and was included based on the inclusion criteria.
Conti, E. C., Stanley, M. A., Amspoker, A. B., & Kunik, M. E. (2017). Sedative-hypnotic use among older adults participating in anxiety	The purpose of this study was to examine frequency of sedative/hypnotic use in the older primary care	There was 483 individuals who were recruited from a	Case-controlled study.	Of the patients in the study, 25% reported taking a benzodiazepine or hypnotic sleep medication in the last 3 months.	Level IV: Case controlled study.	There was a small sample size.	Yes, though the study reports a small sample size there is

Article Title and Author	Study Purpose	Sample	Methods	Study Results	Level of Evidence	Study Limitations	Would use as Evidence to Support a Change?
research. *The International Journal of Aging and Human Development, 85*(1), 3–17. https://doi.org/10.1177/0091415016685330	individuals who were screened and determined to have anxiety.	community and Veteran Health Administration primary care clinics trials as part of a previous cognitive behavioral therapy in adults with generalized anxiety.		Those taking a benzodiazepine were 16% and 12% were reported taking a hypnotic medication. Only 2.69% of the group reported taking a benzodiazepine with a hypnotic medication. Lastly, 96% of the group reported no change in medications in the last 3 months.			information in the study highlighting use of sedatives along with a level IV evidence which meets the inclusion criteria.
Donnelly, K., Bracchi, R., Hewitt, J., Routledge, P. A., & Carter, B. (2017). Benzodiazepines, Z-drugs and the risk of hip fracture: A systematic review and	The purpose of this study was to analyze the association between benzodiazepine use and hip fracture risk	18 studies were included in the systemic review from	Non-experimental descriptive study.	Results of the study showcase the increase in hip fracture risk with benzodiazepine (BNZ) use. Short term use of BNZ	Level 1: Systematic review and meta-analysis	Limitations to the study were around the inability to monitor the amount of benzodiazep	Yes, this study is a level 1 evidence and discusses sedative informatio

Article Title and Author	Study Purpose	Sample	Methods	Study Results	Level of Evidence	Study Limitations	Would use as Evidence to Support a Change?
meta-analysis. *PLoS One, 12*(4), Article e0174730. https://doi.org/10.1371/journal.pone.0174730	compared to the Z-drug use and hip fracture risk.	Medline and Ovid		increases the risk of hip fracture by 140%, with decrease risk for median (53% risk), and long term risk (20% risk).		ine use or Z-drug use on the different study participants.	n which meets the inclusion criteria.
Kim, T. W., Walley, A. Y., Ventura, A. S., Patts, G. J., Heeren, T. C., Lerner, G. B., Mauricio, N., & Saitz, R. (2018). Polypharmacy and risk of falls and fractures for patients with HIV infection and substance dependence. *AIDS Care*, *30*(2), 150–159. https://doi.org/10.1080/09540121.2017.1384532	The purpose of this study is to assess the relationship between the number of medication and falls/fractures in people living with HIV.	250 people were recruited from the Boston medical center between December 2012 and November 2014.	Non-experimental descriptive study.	Results of the study revealed that the risk of falls/accidents were greater with every medication added to the patient's medication list. Odds also increase with each additional sedative medication, and with the prescription of non-opioid sedating medications.	Level 4: Cohort study.	There may be an association between polypharmacy and medical diagnosis instead of medication usage. Another limitation my occur due to low numbers of fractures in the set time (12 months).	Yes, this study will be used due to a level IV evidence and the topic of sedation being discussed which meets the inclusion criteria.

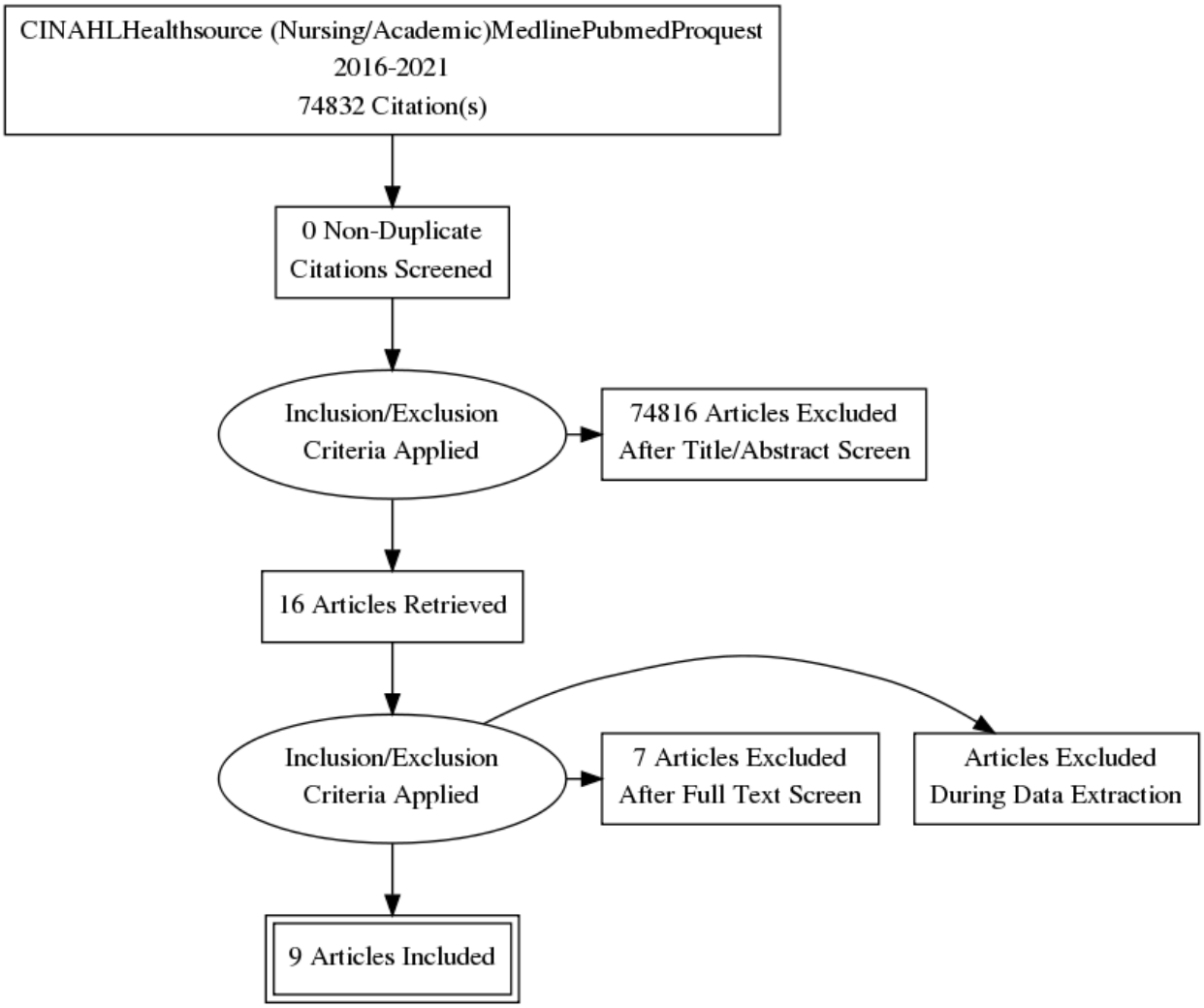
Article Title and Author	Study Purpose	Sample	Methods	Study Results	Level of Evidence	Study Limitations	Would use as Evidence to Support a Change?
				Opioid medications alternatively did not increase the risk for falls and fracture.			
Michalcova, J., Vasut, K., Airaksinen, M., & Bielakova, K. (2020). Inclusion of medication-related fall risk in fall risk assessment tool in geriatric care units. *BMC Geriatrics, 20*, Article 454. https://doi.org/10.1186/s12877-020-01845-9	The purpose of this study is to find a better screening process on falls in healthcare organizations by forming a category of fall risk drugs and incorporating this into and assessment tool in the geriatric units.	188 patient falls data was obtained from two different institutions one was a hospital and the other one was in a nursing home in the Czech Republic on patients who had fallen	Non-experimental descriptive study.	Results of the study show that on admission all patients were screened for falls using a fall risk tool that did not account for medication use. Those who fell during the 2 year time, 41% were on high fall risk medications, 19% were on moderate risk medications, and 40% were on no risk classified medications.	Level 4: Cohort study.	Limitations to this study consist of lack of detail in the nursing home records and potential lack of report of minor falls.	Yes, this information will be used for future practice change due to a level IV evidence and fall and sedation topic discussion which fits in the inclusion criteria.

Article Title and Author	Study Purpose	Sample	Methods	Study Results	Level of Evidence	Study Limitations	Would use as Evidence to Support a Change?
		over a 2 year period.					
Neville, H. L., Losier, M., Pitman, J., Gehrig, M., Isenor, J. E., Minard, L. V., Penny, E., & Bowles, S. K. (2020). Point prevalence survey of benzodiazepine and sedative-hypnotic drug use in hospitalized adult patients. *The Canadian Journal of Hospital Pharmacy, 73*(3), 193–201.	The purpose of this study was to conduct a survey to determine benzodiazepine use and sedative hypnotic drug use in the sample. Also the study wanted to find the initiation rate of benzodiazepines and sedative/hypnotic usage and its characteristics.	This study was conducted in Nova Scotia between June and August in 2016 and included 1409 patients.	Non-experimental descriptive study.	Results of the study showed those who received a BZD/SHD had an average age of 70 with 18% receiving more than 1 agent, with BZD utilized most frequently. 37% of BZD/SHD use was initiated in the hospital setting.	Level 6: Descriptive study.	This study relied on the information charted in the health record and there may also exist data collection fault.	Yes, this evidence would be used due to the level VI evidence and the topic discussion of sedatives which fits into the inclusion criteria.
Ribeiro, T. B., de Melo, D. O., de Oliveria Motta Maia, F., & Ribeiro, E. (2018). Medication-related inpatient falls: A critical review. *Brazilian Journal of*	The purpose of this study is to assess the literature available between medication and inpatient falls	23 articles selected after literature search	Nonexperimental descriptive study.	Results of the study	Level of evidence 1: Systematic review	Limitations of the study consist of weak associations with falls and medications	Yes, this evidence will be used for a practice change due to the level 1 evidence

Article Title and Author	Study Purpose	Sample	Methods	Study Results	Level of Evidence	Study Limitations	Would use as Evidence to Support a Change?
Pharmaceutical Sciences, 54(1), Article e17355. https://doi.org/10.1590/s2175-97902018000117355	despite age of the patient.					and the articles chosen did not have any RCT and there was a low evidence rating for parts of the studies.	and the topic of medications and patient falls which fit the inclusion criteria.
Vaismoradi, M., Amaniyan, S., & Jordan, S. (2018). Patient safety and *pro re nata* prescription and administration: A systematic review. *Pharmacy, 6*, Article 95. https://doi.org/10.3390/pharmacy6030095	The purpose of this study was to explore safety issues and the adverse events that happen related to PRN medication and administration.	This was a systematic review resulting in 5 total articles from databases such as Scopus, PubMed, Embase, CINAHL, Web of Science along	Nonexperimental descriptive study.	Results of the study showcased very few studies compared the use of PRN medications to PCA administration. Findings of PRN medication showcase lower usage of medication with the PRN route as compared to the PCA route. The safety of PRN	Level of Evidence: 1 Systematic Review	Limitations to the study are the low sample size of studies on the topic (5) and different investigated means of the sample.	Yes, this study would be used due to the level 1 evidence and the topic of falls and medication which meet the inclusion criteria.

Article Title and Author	Study Purpose	Sample	Methods	Study Results	Level of Evidence	Study Limitations	Would use as Evidence to Support a Change?
		with Proquest from the years of 2005 to 2017.		medications needs to be studied more to find solid information that applies to patient safety. Side effects of PRN medications are underreported and need to be studied more in-depth.			

Appendix B: PRISMA Diagram



Appendix C: IRB Approval Letter

LIBERTY UNIVERSITY

INSTITUTIONAL REVIEW BOARD

May 3, 2021

Tricia Stevens
Dorothy Murphy

Re: IRB Application - IRB-FY20-21-868 Conscious sedation medications and risk of patient falls: An integrative review

Dear Tricia Stevens and Dorothy Murphy,

The Liberty University Institutional Review Board ORB) 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 is not considered human subjects research for the following reason:

Evidence-based practice projects are considered quality improvement activities, which are not "designed to develop or contribute to generalizable knowledge" according to 45 CFR 46.1020).

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.

Also, although you are welcome to use our recruitment and consent templates, you are not required to do so. If you choose to use our documents, please replace the word research with the word project throughout both documents.

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.

Sincerely,

G. Baker, MA, CIP

Administrative Chair of Institutional Research

Research Ethics Office

Appendix D: CITI Training Certificate

Completion Date 09-Jul-2020
Expiration Date 09-Jul-2023
Record ID 37379650

This is to certify that:

Tricia Stevens

Has completed the following CITI Program course:

Not valid for renewal of certification through CME.

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