REPRESENTATION OF FALL AND INJURY PREVENTION CONCEPTS WITHIN THE INTERNATIONAL CLASSIFICATION FOR NURSING PRACTICE

by

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Abstract

Falls and related-injuries are regarded by many to be avoidable problems in inpatient healthcare. This project analyzed concepts relating to fall and injury prevention and developed a catalogue of terms from the International Classification for Nursing Practice (ICNP) terminology. To-date, a catalogue of terms from the ICNP has not been developed to ensure that the assessments and interventions required to prevent falls and related-injuries can be expressed using that terminology. For this study, five guidelines from US, UK, Canadian, and Australian healthcare quality organizations were identified and concepts were extracted to provide a list of assessment parameters and interventions to prevent falls and related-injuries that could form the basis for a summary catalogue of ICNP terms. Guidelines were limited to those that addressed inpatient care that would involve nursing but were not limited to assessments and interventions solely completed by the nurse. Sixty-three terms were identified and these were mapped to the ICNP to determine how well these concepts can be expressed in this terminology. Findings show that 93.7% of the fall and injury prevention concepts found in these guidelines could be at least partially mapped to terms within the ICNP. Only 79.4% of the 63 terms mapped could be completely expressed by ICNP terms. A majority of terms required more than one term to express the full concept, with 62% of these requiring more than one ICNP term. These findings signal a need for improvements to the completeness of the ICNP terminology to fully express fall and injury prevention concepts, and a need for additional pre-coordinated terms within ICNP to increase the precision of the language.

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Dedication

This project is dedicated to those patients who I have worked with clinically, to the patient partners and advocates that I learn from every day, and for all future patients whose lives will be touched by clinical informatics work and EHRs. It is my deepest desire that the study and practice of clinical informatics helps to improve your health, the care you receive, the information that you are provided, and the improvement of your lives.

Chapter 1: Introduction

The International Classification for Nursing Practice (ICNP) is one of many representational nursing terminologies that aim to structure, clarify, and standardize the communication of nursing practice across settings, languages, and technologies (Clark & Lang, 1992; Hardiker & Coenen, 2007; International Council of Nurses, 1996; Warren, 2014; Westra, Delaney, Konicek, & Keenan, 2008). Other examples of nursing terminologies are the Clinical Care Classification (CCC), North American Nursing Diagnosis Association (NANDA), Nursing Interventions Classification (NIC), Nursing Outcomes Classification (NOC), Omaha System, and the Perioperative Nursing Data Set (PNDS) (Nelson & Staggers, 2018). There are many additional examples of interprofessional or medical terminologies such as the International Classification of Diseases (ICD), Systematized Nomenclature of Medicine (SNOMED), and the Unified Medical Language System (UMLS) (Coiera, 2015). Common features to these terminologies include standardized classifications of medical and healthcare phenomena to ensure concise language is used to describe assessments, interventions, and findings. Many of these terminologies also feature numeric or alphanumeric codes that correspond to terms within them and which are present in order to ensure that the terms are computable. Computable forms of data enable real-time computerized clinical decision support and also support methods for data to be extracted from a database for use in administrative reporting or research (International Health Terminology Standards Development Organization, 2014).

In addition to providing standardized terms, ICNP allows for the development of concept catalogues that are particular to a practice area or type of nursing care. A catalogue can be used to make ICNP accessible at the point of care to clinical users and promote the utilization of evidence-informed care across diverse settings and care areas (International Council of Nurses,

2008). The process of developing a catalogue can also identify concepts that are absent from ICNP and can help articulate directions for additions to the terminology (Coenen & Kim, 2010). The International Council of Nurses (ICN) supports the development of ICNP by publishing guidelines and providing support for nurses who aim to develop such a catalogue (International Council of Nurses, 2008). Catalogues to-date include care related to an entire patient population as well as patient-specific issues to help promote quality and consistency of care being provided. As of the writing of this paper (August 2018), the ICNP does not include fall and injury prevention in a catalogue of patient care issues.

Inpatient falls, with or without injury, are a significant concern in healthcare (Ganz et al., 2013; Oliver, Healey, & Haines, 2010; Slade, Carey, Hill, & Morris, 2017; Sutton, Windsor, & Husk, 2014; Tricco et al., 2017). Nurses routinely assess risk of patient falls, and implement general and individualized fall-prevention strategies to help reduce the risk of falls or injuries if a fall does occur (Miake-Lye, Hempel, Ganz, & Shekelle, 2013). Frequently, standardized tools are used to assess the level of risk, but the interventions and associated assessments are not yet standardized (Hempel et al., 2013; Tricco et al., 2017). The application of a standardized terminology may assist in the clear communication, comparability, and coded documentation of these assessments and interventions. As Dykes et al. report, (2010), health information technology systems have not been effectively used to assist with fall risk and injury prevention; however, this is a critical area for system development with a potential for positive impacts in patient outcomes and care. In this project, I aim to contribute to the integration of this nursing practice priority within the ICNP and aim to lay groundwork that will lead to comparability and computability of fall and injury prevention concepts within electronic health records. Thus, the

purpose of this project was to create a catalogue of INCP terms to map fall prevention guidelines.

1.1 International Classification for Nursing Practice and Quality of Care Concepts

Since the early 1990's nurses have been discussing and working toward creating an international, consistent terminology to describe goals of care, outcomes, and interventions that nurses effect in the care that they provide (Clark & Lang, 1992; Hardiker, Saba, & Kim, 2015). The ICNP is one example of a nursing terminology and is a made up of a set of nursing diagnoses, interventions, and activity terms sorted into axes that can be used consistently across settings, countries, and languages to articulate care in a standardized way (Nelson & Staggers, 2018). The ICNP aims to serve as a tool to assist the nursing profession in increasing the visibility, measurability, and comparability of nursing practices. Many authors have studied the impact of ICNP on these issues in nursing, such as the ability to measure and compare care across settings and patient populations (Baernholdt & Lang, 2003) and the visibility of the care that nurses provide in recordkeeping (Clark, 1996). The aim of the ICNP is to provide a method to capture 'what nurses do' which may help to increase the quality of nursing care provided by enabling the comparison of care provided across settings to disseminate evidence-informed and effective interventions. This information about nursing practice could influence policymaking and enhance allocation of resources and care to patients (Baernholdt & Lang, 2003). To date, research about the ICNP has been mostly limited to descriptions of use or determining clinical appropriateness, but early steps are being taken to study and articulate where ICNP can be used to impact the quality of care (Strudwick & Hardiker, 2016).

A proposal for the development of an international classification of nursing practice was first put forth at the 1989 ICN annual meeting (Clark & Lang, 1992). During the 1990's the ICN released an alpha (preliminary) version of the terminology, and encouraged nurses to participate in validating the terms presented therein (Clark, 1996). As the terminology was developed, the content of publications changed to include validations of the terms against other established terminologies (Bakken, Parker, Konicek, & Campbell, 2000; Dykes et al., 2009; Luciano, da Nóbrega, Saparolli, & de Barros, 2014; Moen, Bakken Henry, & Warren, 1999; Müller-Staub, Lavin, Needham, & van Achterberg, 2007). Additionally, many international studies of validating terms within ICNP to documented clinical care were completed to ensure representation of the practice of nursing within the terminology (Coenen, Doorenbos, & Wilson, 2007; Geyer, MD, Roussouw, Morudi, & Uys, 2005; Hall & Thornton, 2007; Ikematsu, 2004; Jiang, Sato, Endoh, Ogasawara, & Sakurai, 2007; Kennedy, 2008; Kuo & Yen, 2006; Park, Cho, & Chung, 2011; Rotegaard & Ruland, 2010). Once the adequacy of representation had been established on a variety of clinical areas and subjects, the development of the terminology took a step forward. Another subset of resources focused on the creation of catalogues (Anso, Un, Icnp, La, & Del, 2013; Choromanski, Collins, Hart, Westra, & Delaney, 2012; de Castro & Fuly, 2014; Lins, Santo, & Fuly, 2011). These catalogues can be used to support standardization of national and international nursing practice.

1.2 International Classification for Nursing Practice Development

New terms and concepts are added to ICNP by way of a collaborative, iterative process whereby nurses or organizations can submit new terms to the International Council of Nurses administrators; these terms and concepts are then considered for inclusion within the terminology

(Clark, 1996). Similarly, the ICN encourages nurses to develop catalogues of terms and concepts for submission and addition to ICNP. To-date, a number of catalogues have been compiled to outline a set of terms specific to a particular area of nursing practice. Some examples include a catalogue for palliative care interventions and outcomes to promote dignified dying (International Council of Nurses, 2009a as cited in Coenen & Kim, 2010) and promotion of adherence and treatment (International Council of Nurses, 2008 as cited in Coenen & Kim, 2010). These catalogues serve to provide a framework for discussion of practice across organizations, or national and international borders to highlight best practices or areas for improvement.

Once terms are developed, validated, and accepted into the terminology, ICNP terms are assigned a numeric code. This allows for terms to be translated into other languages but remain associated with the numeric code. The numeric code creates a unique identifier for the term, that regardless of language and documentation platform being used, the numeric code identifies the concept for comparability. Unique identifiers were added to the terminology after a 2003 International Standards Organization (ISO) guideline, as well as a recognition in 2008 by the American Nursing Association that a unique identifier was a keystone in the future ability for languages to translate across electronic interfaces (Hardiker et al., 2015). Nelson & Staggers (2018) point out that unique numeric codes have many purposes, including use to support data retrieval and exchange since numeric codes are more easily sent, received, and interpreted by computer interface technologies. Unique identifiers associated with ICNP terms may be used within a variety of clinical documentation systems; for example, within a clinical electronic health record for comparison and standardization of data (Warren & Coenen, 1998) or to prevent

inconsistencies made by typing errors, and to help provide clinicians with structured data (Nelson & Staggers, 2018).

1.3 Measurement of Nursing Sensitive Outcome Indicators

The International Council of Nurses (2009b) outlined their vision of the impact of nursing care on Nursing Sensitive Outcome Indicators, which they said represented "what nurses do, what outcomes they achieve and at what cost". Their statement was building a large body of research in which the impact of point-of-care nursing was examined in relation to health outcomes of patients within acute care facilities, both the desired and unintended outcomes (Aiken et al., 2017; Brown, Donaldson, Burnes Bolton, & Aydin, 2010; Gallagher & Rowell, 2003; Idvall, Rooke, & Hamrin, 1997; International Council of Nurses, 2009a; Kitson, 1986; Needleman & Buerhaus, 2003; O'Brien, Weaver, Settergren, Hook, & Ivory, 2015; Pappas, 2008). Nursing Sensitive Outcome Indicators include prevention of falls, hospital acquired pneumonia, pressure ulcer formation, catheter associated urinary tract infections, and central venous catheter associated bloodstream infections (Brown et al., 2010; Stalpers, de Brouwer, Kaljouw, & Schuurmans, 2015). Nursing interventions for the reduction of unintended patient outcomes while in care involve screening, and care planning targeted toward that outcome, and standard interventions aimed at every patient and every interaction to prevent harms (Miake-Lye et al., 2013). Some of these suggestions have included "care bundles" guidelines, best practice policies, education, and care plans have been implemented across settings (J. S. Kim, Holtom, & Vigen, 2011; Rello, Chastre, Cornaglia, & Masterton, 2011; Sutton et al., 2014; Westwell, 2008). Overall, these bundles have had a positive impact on nursing practice. For example, Kim et al,

found that implementing a central venous catheter care bundle reduced both gram positive and fungal infections in an ICU setting.

1.4 Nursing Sensitive Outcomes in the International Classification for Nursing Practice

In collaboration with the Canadian Nurses Association, the ICN published a catalogue summarizing nursing outcomes indicators, including many of the outcomes deemed to be "nursing sensitive" (International Council of Nurses, 2009b). These indicators represent nursing diagnosis of patient status and nursing care related patient risks; however, the catalogue does not contain many interventions that the nurse would enact after a deficiency or risk was identified. This catalogue also does not include any risk factors that could contribute to a risk of falling or becoming injured as a result of a fall, it only considers the number of falls in a given time frame or the event of an actual fall. A catalogue by Jansen (2013) outlined the diagnosis, goals, and interventions for the care to prevent pressure ulcers and provides more detail of interventions and assessments that the nurse would undertake to prevent pressure ulcers. A next logical step to improve nurse sensitive outcomes would be to use the work done by Jansen as a model for improving other patient outcomes on other nurse sensitive outcomes. Creating a concise catalogue of this type would provide detailed information about the assessments, interventions, and nursing diagnosis relating to the care provided by nurses. Continuing this work would fulfill two goals; one, to ensure that the ICNP has adequate terminology to address these fundamental nursing practices and processes and, two, by providing a subset of diagnosis, interventions, and outcomes that help address outcome indicators that are sensitive to the care that nurses provide.

1.5 Review of Fall and Injury Prevention Programs

Systematic reviews of fall prevention programs (Hempel et al., 2013; Slade et al., 2017) have identified that despite publications detailing fall assessment, education and intervention programs in hospitals across the US, there remains a lack of sufficient data to reveal which specific measures were effective for fall and injury prevention. Many of the resources utilized in the systematic review by Hempel and colleagues detailed interventions for staff education. Additionally, two other groupings of interventions were found in this review; interventions that were appropriate for all patients and interventions that were appropriate for only patients with a high risk of falling. Barker et al. (2016) used a similar stratification of interventions based on risk in a randomized controlled trial to implement a fall risk 'bundle' but found there were no significant differences between the intervention and control groups to conclude that the intervention was effective. Falls and related injuries continue to be a persistent problem and a frequent subject of guidelines and attention in healthcare quality literature, despite the lack of evidence about how to prevent falls and related injuries.

1.6 Representation of Fall and Injury Prevention for Nursing Practice

The incidence of falls and injuries as a result of a fall are found throughout nursing literature as examples of outcomes that are sensitive to the care that nurses provide (Lake & Cheung, 2006; Oliver et al., 2010; Sutton et al., 2014). The Agency for Healthcare Research and Quality, reported that annually there are 700,000 to 1,000,000 inpatient falls across the US (Ganz et al., 2013). Canadian resources report that 3% of inpatient hospitalizations include an incident of in-patient harm, which includes fracture, dislocation and other types of harm including burns (Canadian Institute for Health Information, 2016). Inpatient falls have the potential to lead to

significant patient harm in the form of fractures or trauma, with estimates that 1 - 3% of inpatient falls lead to fracture and incidence of any injury range from 30 – 51% of falls (Oliver et al., 2010). Despite the effect that falls and fall-related injuries have on patients under the care of nurses, an ICNP catalogue has not yet been created. A number of authors have studied representation of falls assessment and injury prevention interventions in other standardized terminologies, such as Logical Observation Identifiers Names and Codes (LOINC) (Currie, Mellino, Cimino, & Bakken, 2004), and International Classification of Diseases, version 10 with Australian modifications (ICD-10 AM) (Liaw et al., 2003). A catalogue of nursing assessments and interventions for fall and injury prevention in ICNP terms would help to further the work to improve nursing sensitive patient outcomes and would help to ensure that these important care parameters could be expressed in the ICNP terminology.

1.7 Falls in International Classification for Nursing Practice

To-date, no completed catalogue of falls and injury prevention terms has been made in ICNP (Hardiker, personal communication 2017). Dykes et al. (2009) compared an organizational nursing data set to ICNP terms, and while it is noted that the data set contained terms related to standardized assessments of fall risk (i.e., Morse Fall Scale) the completeness of the representation of fall and injury prevention terms in ICNP is not described. Oliveira, Nóbrega, & Oliveira (2015) completed a comparison of nursing diagnosis in a model for basic human needs and ICNP. This mapping found a match in ICNP to the nursing diagnosis for "falling risk" but did not delve into contributing factors, interventions for prevention, or assessments to determine risk. Similarly, Diniz et al. (2015) identified a small number of concepts related to falls within the ICNP terminology. This group did not comment on the

comprehensiveness of the terminology to fully express the assessments and interventions related to falls. The intent of the study by Diniz et al. was to examine a case study and frame an ICNP-based care plan on an exemplar patient scenario, so their interventions and assessments were targeted toward that scenario.

1.8 Theoretical Foundation

The theoretical underpinning for this project is Matney's theory of Wisdom in Action. The Data, Information, Knowledge model by Graves and Concoran (1989) was one of the first frameworks used in Nursing Informatics. In 2008, this model was expanded upon and published as the DIKW model in the publication of the American Nurses' Association (ANA) Nursing Informatics Scope and Standards of Practice (American Nurses Association, 2008). In the 2008 ANA model, the concept of wisdom was drawn from Zeleny (2006) and is explained to be the application of knowledge by way of distinguishing rationale for clinical actions. In the Theory of Wisdom in Action Matney expanded the Data, Information, Knowledge, Wisdom (DIKW) model to situate wisdom within *the act of practicing* nursing. Within the Theory of Wisdom in Action, Matney posits that data are structured and contextualized into information to make up the environment of related factors that precede wisdom for the nurse. After logic and computational rules are applied, the information is combined with other factual information, procedural knowledge derived from the practice environment, and contextualized, the nurse uses this wisdom to make clinical decisions. Since nurses use electronic health records for information and documentation in patient care, these systems need to support and assist clinical decision-making. This underscores the importance of the data, information, rules, and logic for clinical practice to be well integrated into an electronic health solution that supports the nursing process

and information flow to facilitate clinical decision-making. The relationship between the Theory of Wisdom in Action and ICNP is that the ICNP supports structured documentation which permits classification of nursing practice. For example, when nurses document fall and related-injury risk assessment and prevention interventions in a standardized manner, the data would allow for comparison and identification of care that is effective to prevent falls and related-injuries. Then the results could be fed back into clinical practice to support nurses' decision-making, and further help build knowledge of effective interventions.

1.9 Purpose

The purpose of this project was to determine the completeness of concepts within ICNP to express fall and injury risk assessments and interventions to reduce risk and prevent falls and related-injuries, and to create a fall and injury prevention catalogue using ICNP terms. A fall and injury prevention catalogue for ICNP will assist nurses in clearly communicating the assessments, planning, and interventions that they undertake in addressing a fall risk and preventing injuries from inpatient falls.

Chapter 2: Methods

In this chapter, the methods for identifying guidelines for fall and injury risk assessment and management will be reviewed first. Next, the process of extracting concepts and terms from published guidelines are detailed. The process of matching and mapping the extracted terms to established ICNP terms will then be described.

2.1 Searching for Guidelines

The investigation into best practice guidelines to guide nursing care for fall and injury prevention began with an internet search using Google and Google Scholar. The key terms of 'fall prevention guideline', 'hospital falls' and 'inpatient fall prevention' were used. Guidelines from organizations known by the author to be leaders in patient safety or quality care were targeted. The rationale for using these sources was to find resources that could be accessed publicly or without subscription costs.

2.2 Inclusion and Exclusion Criteria

Guidelines that were published in the last 10 years, that focused on inpatient hospital falls, and that contained both assessment and intervention recommendations were included. Guidelines that focused on a community setting were excluded because focus on the community care setting would have required a much larger scope project that would be beyond the timeline feasible for this project. Guidelines were also included if they summarized a body of literature to present recommendations from a broad base of resources. It was necessary to find guidelines that had discrete assessments and interventions listed so that mapping could be performed (i.e., ICNP terms are explicit to describe an action, a particular assessment, or a desired outcome).

Therefore, guidelines that did not have discrete intervention and assessment concepts were excluded.

2.3 Concept Extraction from Fall and Injury Prevention Guidelines

From the selected guidelines, the recommended actions were extracted into concept phrases. For the purpose of mapping, a 'concept phrase' was created based on the following rules: 1) use as few words as possible to capture the meaning; 2) attempt, where possible, to use key terms from the guideline in the extracted recommended action, and 3) break into more than one concept phrase if the recommended action was not completely expressed in three or fewer ICNP terms. Many of the concepts were present in multiple guidelines (see Tables 3.3 and 2.4 in the next chapter). Guideline concepts were extracted and synthesized into concept phrases to summarize lengthy or complex recommendations.

Once the concepts were extracted, content analysis was performed to classify the concepts into relevant groups. In the first step, concepts were grouped into two categories: 1) *assessments*, which were parameters that a nurse would investigate with the patient to determine presence of fall or injury risk factors, and 2) *interventions*, which were activities that a nurse would enact to prevent a fall or prevent injuries from a fall. In a second step, concepts in each of the main groups were classified into subgroups of physiologic and psychologic assessments, assessment of contextual factors, assessment of external safety considerations, nursing care interventions, patient and family education, referrals and collaboration, personal safety accessories, and equipment safety measures.

2.4 Guideline Terminology Mapping

Guideline mapping was undertaken by manually searching the concept in the same lexical terms that the guideline contained, using the ICNP Web browser 2017 version. As a preliminary step, the terms were searched in the ICNP Browser using the short phrases extracted. The ICNP browser does not utilize a search function that searches for synonyms, so repeated queries need to be undertaken until a word could be found. If no exact lexical matches were found, synonyms or semantic equivalents were next used. Synonyms were developed by the author by using knowledge of the content area. For example, for the guideline term 'altered mental status (assess for)' the first term entered into the ICNP browser was 'altered mental status'. When no match was found, the author used terms such as 'confusion', 'disorientation' and 'cognition' to find matches for all. The rationale for selecting 'altered cognition' instead of confusion or disorientation is that since 'mental status' could mean a wide variety of types of mental or cognitive processes, cognition is similarly as broad but confusion or disorientation were more specific than mental status. If no matches were found, then individual words were searched to obtain terms that could be combined to express the concept. For example, for the actions to 'assess feet and footwear', the exact term yielded no results. Therefore, the individual words 'feet' and 'footwear' were entered into the ICNP browser and the final result was 'assessing', 'foot' and 'bilateral' to express the concept of assessing the feet and 'assessing', 'clothing' and 'foot' to express the concept of assessing footwear. Automated mapping was not undertaken since the ICNP browser does not have an automated function available.

2.5 Analysis of Mapped Terms

After mapping was complete, an analysis was completed of whether the concept was fully expressed by the ICNP terms or whether it was only partially expressed. If a concept could be completely expressed by one or more ICNP terms, it was coded as a 'Complete' match, and the detail of whether this complete expression required one ICNP term (a 'One-to-one' mapping) or more than one (a 'One-to-many' mapping) was added. If a concept could not be fully expressed using current ICNP terms, it was coded as "Partial". Partial matches are implied to require a "one-to-many" mapping, but only concepts that were completely mapped were analyzed to be a one-to-one or one-to-many type of match. Concepts in which no ICNP terms were found were coded as 'No match'. Descriptive statistics, including frequencies and percentages, were used to determine proportion of completeness of mapping and types of mapping that were used.

2.6 Terminology Validation by Experts

The ICN suggests that ICNP catalogue development (International Council of Nurses, 2008) should involve validating the catalogue or concepts being proposed with nurse experts in the field. After the initial mapping was done by the author, the concept mappings were reviewed and validated by a colleague who has expertise in terminology mapping. This colleague is a Registered Nurse with experience in mapping standardized terminologies to concepts based in their practice. The mappings were also validated with a specialist in fall and injury prevention who is an Occupational Therapist by background but has professionally written interdisciplinary fall prevention guidelines and has been chosen by their organization to lead fall prevention work. The review with the Registered Nurse with expertise in terminology mapping and ICNP aimed to

review the validity of the mapping process. The review by the fall prevention specialist aimed to ensure that the ICNP concepts expressed closely the lexical meaning of the care recommended in the fall prevention guidelines (i.e., content validity). In review of the mappings with both reviewers, consensus was achieved after modifications to term mapping or assessment of completeness of match.

Chapter 3: Results

3.1 Description of Included Guidelines

Nine guidelines were identified, but only five met the inclusion criteria for the analysis. Resources from Australian Commission on Safety and Quality in Health Care (2009), Agency for Healthcare Research and Quality (Ganz et al., 2013), National Institute for Health and Care Excellence (2013) Royal College of Physicians (2012) and Safer Healthcare Now! (2013) were found to meet these criteria and were utilized.

These five guidelines represented a variety of organizations, countries, and strategies for presenting recommendations. In total, five resources that were identified had a wide base of primary sources (n=987 references collectively), but only 10% of the references were found in more than one guideline. Many of the guidelines were interdisciplinary in their focus (Australian Commission on Safety and Quality in Health Care, 2009; Ganz et al., 2013; National Institute for Health and Care Excellence, 2013; Safer Healthcare Now!, 2013) and involved nurses within the development of the guideline. One resource was published by an organization representing physicians in the United Kingdom (Royal College of Physicians, 2012), although it was developed in partnership with interdisciplinary and nursing organizations and has framed recommendations with an interdisciplinary lens. Table 3.1 shows the authors, title, year and country of publication and relative year of evidence used to create the guidelines that were included.

3.2 Description of Excluded Guidelines

A joint guideline developed by the American Geriatrics Society and the British Geriatrics Society (Drootin, 2011) was excluded because the focus of assessments and interventions was

outpatient care. The 2004 publication by the British Columbia Ministry of Health Planning guideline was excluded because it was published more than ten years ago (Scott, Peck, & Kendall, 2004). A guideline by Registered Nurse's Association of Ontario (2005) was excluded because the assessments and interventions concepts were too broad to allow for term extraction and mapping (e.g., the recommended actions included broad concepts such as "Assess Fall Risk on Admission" and an intervention of "Exercise", but not more detail). Similarly, a systematic review by Cameron et al. (2012) contained aggregated recommendations such as "Exercise" and "Environment/Assistive Technology" which could not be broken down into more discrete actions.

Table 3.1 Publication Information and Characteristics of Included Guidelines

No.	Authors or Authoring Organization	Title	Country	Year	Age of Evidence Used	Number of References	Care Venue
1	Agency for Healthcare Research and Quality (AHRQ)	Preventing Falls in Hospitals - A toolkit for improving quality of care	United States	2013	1984-2011	55	Inpatient Hospital
2	Australian Commission on Safety and Quality in Healthcare (ACSCH)	Preventing Falls and Harm from Falls in Older People - Best Practice Guidelines for Australian Hospitals	Australia	2009	1975-2009	366	Inpatient Hospital
3	Safer Healthcare Now! (SHN)	Reducing Falls and Injuries from Falls	Canada	2013	1993-2012	114	Acute Care
4	National Institute for Health and Care Excellence (NICE)	Falls in Older People: Assessing risk and prevention	United Kingdom	2013	1981-2012	436	Inpatient healthcare
5	Royal College of Physicians (RCP-UK)	Implementing FallSafe – Care Bundles to Reduce Inpatient Falls	United Kingdom	2012	2004-2010 (1978)	16	In hospital

3.3 Concepts Found in Guidelines

A total of 63 concepts were identified within the guidelines, which could be classified into two groupings: 'Assessments' (n=30) and 'Interventions' (n=33). Many guidelines listed the assessments and interventions in temporal order based on a patient's hospitalization, starting with assessing falls on admission and assessing other factors before moving onto interventions, but only the resource from Safer Healthcare Now! (2013) distinguished assessments from interventions by putting these components into different chapters. The ICNP also separates assessment from intervention; therefore, concepts were further categorized into these two sub-categories. After mapping, concepts were expressed with the key concept within the short phase as the beginning of the concept listing, to increase readability and to facilitate sorting.

A variety of patient-specific factors were included in the assessments found within the guidelines. These included physiologic measurements (e.g., blood pressure, heart rate and regularity), physiologic assessments (e.g., the presence of dizziness, cognition, orientation) contextual factors (e.g., unfamiliar environment, mobility aids), health conditions (e.g., bowel and bladder continence, osteoporosis, malnutrition), and knowledge (e.g., awareness of fall risk and prevention). A full list of assessment concepts is found in Table 3.3.

Interventions included actions that the nurse would undertake such as patient education (e.g., about fall risk factors), application and use of patient safety accessories (e.g., sensory aids, footwear, hip protectors), safety measures related to equipment that was in use (e.g., bed or wheelchair wheel locks, bed rails, mobility aids), direct nursing care interventions (e.g., scheduled or assisted toileting, medication monitoring or modifications), as well as the involvement of specialized health care providers through referrals (e.g., inpatient referral to physical therapists or referral to outpatient services). During the review process with the two

reviewers, 14 changes were made to the original mapping. These modifications were made based on their expertise in the content area or the terminology. This included five changes to the assessment of the completeness of match, one concept split into two which changed a partial concept mapping into two complete mappings, and a further eight modifications to the mapped terms used. A comprehensive list of intervention concepts is found in Table 3.4 including whether or not the concept was identified in a specific guideline.

The guideline with the largest number of concepts was published by Safer Healthcare Now! (2013) (total concepts = 38), while the NICE guideline (2013) guideline had the fewest (total concepts = 19). There were more intervention concepts (n=33) than assessment concepts (n=30). The guideline with the most assessment concepts was by the Australian Commission on Safety and Quality in Healthcare (2009) (n=17), while the AHRQ (2013) guideline had the fewest assessment concepts (n=9). The guideline with the most intervention concepts was the Safer Healthcare Now! (2013) (n=22), and the guideline with the fewest intervention concepts was NICE (2013) (n=5). Interestingly, assessments of contextual factors such as cultural components or income were only included in the guideline from Safer Healthcare Now! (2013).

Table 3.2. Summary of Concepts for Each Guideline

Concepts	AHRQ	ACSCH	SHN	NICE	RCP-UK
Assessments	9	17	16	14	12
Interventions	16	17	22	5	9
total	25	34	38	19	21

The concepts were largely different between guidelines. A small number of assessment concepts (n=3, 10%) were found in all guidelines including assessing for high-risk medications, impaired gait or mobility, and visual impairment. The only intervention (n=1, 3%) that was present in all guidelines was to ensure that the bedside area was free from clutter or trip hazards. Fourteen out of 30 (47%) assessment concepts were found in only one guideline, and 10 out of 33 (30%) intervention concepts were found in only one guideline. Nine of 33 interventions (27%) were only present in one guideline, and most (n=7 of 9) present in only one guideline, (78%) were in the sub-category of nursing interventions. Only five of the 12 nursing care interventions (42%) were found in more than one guideline, these were care planning, scheduled rounding, regular toileting, universal fall precautions, and urinalysis. The only other interventions that were present in only one guideline were utilizing bed and chair alarms, utilizing non-slip floor mats, and maintaining bottom bed rails down if appropriate (see Tables 3.3 and 3.4).

Table 3.3 Assessment Concepts from Each Guideline (n=30)

Concept Phrase	Concepts in Guideline				
	AHRQ	ACSCH	SHN	NICE	RCP-UK
Psychological & physiological assessments (n=20)					
Altered mental status (Assess for)	X	X		X	X
Cardiac arrhythmias (Assess for)					X
Continence – bowel (Assess for)	X	X		X	X
Continence – bladder (Assess for)	X	X		X	X
Depression (Assess for)					X
Dizziness and vertigo (Assess for)		X		X	
Fear of falling (Assess for)			X	X	
Feet (Assess for)		X		X	
Frequent falls (Assess for)	X	X	X		X
High risk medications (Assess for)	X	X	X	X	X
Impaired gait or mobility (Assess for)	X	X	X	X	X
Nutritional status (Assess for)			X		
Orthostatic hypotension (Assess for)			X	X	X
Post-Fall Reassessment and Cause Analysis	X	X			
Presence and treatment appropriateness of osteoporosis (Assess for)		X	X	X	X
Recent fall incident (Assess for)				X	
Standardized assessment of falls risk/factors	X	X	X		
Syncope (Assess for)		X			
Vitamin D and calcium supplementation requirements (Assess for)		X			
Visual impairment (Assess for)	X	X	X	X	X
Assessment of Contextual Factors (n=5)					
Cultural components (Assess for)			X		
Inadequate support networks (Assess for)			X		
Low income (Assess for)			X		
Social Determinants of Health (Assess for)			X		
Social isolation (Assess for)			X		
Assessment of External Safety Considerations (n=5)					
Appropriateness of bed rails (Assess for)					X
Appropriateness of hip protectors (Assess for)		X			
Assistive devices (Assess for)			X		
Environment (Assess)		X	X	X	
Footwear (Assess for)		X		X	
Total number of concepts per guideline	9	17	16	14	12

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Table 3.4 Intervention Concepts from Each Guideline (n=33)

Concept Phrase	Concepts in Guideline				
	AHRQ	ACSCH	SHN	NICE	RCP-UK
Nursing Care Interventions (n=12)					
Accompaniment in the bathroom		X			
Care Planning	X	X	X		
Epley maneuver or vestibular rehabilitation (Perform)		X			
Mobilization (Regular)			X		
Night sedation (Avoid)					X
Restraints (Avoid use of unless necessary)			X		
Risk to care team members (Communicate)			X		
Rounding (Scheduled)	X		X		
Safe patient handling practices	X				
Toileting (Regular)			X		X
Universal Falls Precautions	X		X		
Urinalysis (Perform)		X			X
Referrals and collaboration (n=2)					
Appropriate services post-discharge from hospital (Referral to)		X		X	
Appropriate therapist for inpatient care (Referral to)		X			X
Personal safety accessories (n=4)					
Hip protector devices (Utilize)		X	X		
Nonslip footwear available/on patient (Keep)	X	X	X		X
Personal belongings are within reach (Ensure)	X	X	X		X
Sensory aids within patient reach (Ensure)			X		X
Equipment safety measures (n=11)					
Area is uncluttered/free from trip hazards (Ensure)	X	X	X	X	X
Bed and chair alarms (Utilize)			X		
Bed in low position when not transferring (Maintain)	X	X	X		
Bed rails (bottom) down unless assessed otherwise			X		
Bed wheel locks engaged (Maintain)	X	X	X		
Call light/bell within reach (Maintain)	X		X		X
Floors clean and dry (Maintain)	X	X			
Handrails in obvious locations (Have)	X	X			
Nightlights or supplemental/purpose lighting (Use)	X	X	X		
Non-slip floor mats (Utilize)			X		
Wheelchair wheels locked when stationary (Maintain)	X	X	X		

Table 3.4 Intervention Concepts from Each Guideline (n=33) (continued)

Concept Phrase	Concepts in Guideline				
	AHRQ	ACSCH	SHN	NICE	RCP-UK
Patient/Family Education (n=4)					
Call light/bell use (Return demonstration of)	X			X	
Falls risk and interventions (Educate family on)			X	X	
Falls risk and interventions (Educate patient on)			X	X	
Surroundings (Familiarize patient with)	X	X			
Total number of concepts per guideline	16	17	22	5	9

3.4 Concepts of Note During Consultations with Experts

Many of the term mappings were readily agreed to by both peer reviewers without the need for reaching consensus through discussion. Both peers remarked on the mapping of "assess for syncope" to the concept of assessing consciousness, as both remarked that a vasovagal response or orthostatic hypotension were not directly related to consciousness. In discussion, after I had clarified that syncope refers to a loss of consciousness which could be from a variety of causes, including the two reasons they referred to then both felt that it was an appropriate mapping. Both also commented that the mappings for the concepts of "assess for cardiac arrhythmias" and "assess for orthostatic hypotension" helped to clarify the earlier mapping for syncope. The nursing assessment surrounding a patient's feet and footwear was initially as one concept, with a partial match until discussion was had in which my peer pointed out that assessing a patient's feet is a very different type of nursing action than assessing someone's footwear. After separating those concepts, I was confident that classifying each of these as a complete mapping was defensible. Both peer reviewers agreed that the social determinants of health are an important set of parameters to assess patients on to get a more robust picture of the risk of falling or being injured from a fall.

3.5 Thematic Categorization

The assessments and interventions were grouped into themes by topic to represent different care parameters under the umbrella of fall and injury prevention. The assessment concepts found were themed into three types of assessments that the nurse would perform to determine the fall and injury risk of a patient in their care, as shown in Table 3.3. The largest grouping was that of physiologic and psychologic assessments (n=20). Within this group were the assessments of previous falls, rate of falling, as well as assessments of numerous body systems that could contribute to patient fall risk or risk of becoming injured secondary to a fall. The next grouping was that of contextual factors that the evidence suggests can contribute to fall or injury risk. This grouping includes social supports, financial status, or cultural beliefs. The third grouping of assessments were inquiries that that nurse would undertake on the safety considerations external to the patient's context or physiology. These assessments include the environment, the patient's footwear or mobility aids.

The intervention concepts (Table 3.4) were grouped to express different types of nursing care that would be enacted as interventions for fall and injury prevention. Education for family members and for patients was grouped together, as patient education and evaluation of their understanding is a very specific skill for nurses. The next grouping was that of referrals and collaboration with other health care professionals. Nursing care interventions was a larger group of interventions found that denote the direct care that a nurse would provide, though some of the interventions may have been suggested or initiated by other professionals involved in the care of that patient. Patient sensory aids or devices was the next grouping. These items are things that may be applied or assisted by the nurse but are worn by the patient. A large grouping was for environmental safety concepts. Many of these components were items, processes, and objects

that are enacted or used by the nurse to prevent falls and injuries but are equipment or features of equipment.

3.6 Completeness Evaluation of Mapping

Once the activity of matching the lexical or semantic meaning of the guideline terms to ICNP terms was concluded, an analysis of the completeness of terminology mapping was undertaken. Mapping completeness was analyzed in two ways, firstly to determine if the concept could be expressed fully by using one or more current ICNP terms, and next to detail whether terms could be partially expressed or not. Terms used to describe the completeness of mapping followed the convention used by Kim, Hardiker, & Coenen (2014) by describing mappings as one-to-one or one-to-many. Terms that could not be mapped to a complete semantic meaning are noted to be an incomplete mapping.

Fifty of the 63 concepts (79.3 %) could be completely mapped using ICNP terms. Of these, 19 concepts (38% of the 50 concepts) could be completely mapped using one ICNP term. A further 31 concepts (62% of the 50 concepts) could be completely mapped using more than one ICNP term. Nine of the 63 concepts (14.3%) were partially mapped using ICNP terms. While terms that were only partially mapped to ICNP terms can be thought of as one-to-many matches, partial matches were not included in the total reported as one-to-many matches because there was no method to fully express the recommended assessment or intervention using ICNP. For a small number of concepts (n=4, 6.3%) no matches were found within ICNP.

Table 3.5 shows the summary of mapping completeness by grouping category. Assessment of contextual factors had the highest proportion of concepts that could be mapped using only one ICNP term (n=3 of 5 concepts, 60%). The grouping of equipment safety

measures was not well-expressed using one ICNP term (n=1 of 11 concepts, 9.3%), although a further 72.7% (n=8 of 11 concepts) could be completely expressed using more than one ICNP term. The assessment grouping of external safety considerations had a high number of concepts that required more than one ICNP term to express the concept (n=4 of 5 concepts, 80%). The only grouping that could be completely mapped to ICNP was assessments of external safety considerations.

Nursing interventions had the largest number of partial matches (n=5 of 12 concepts, 41.7%). There were only two concepts in the grouping of referrals and collaboration, but only one of these had a match. Assessments of contextual factors had only one concept that had no match in ICNP. Two categories of interventions had concepts that could not be mapped: personal safety accessories and equipment safety measures (i.e., there were not partial matches or no matches in this category).

Table 3.5 Summary of Mapping Completeness by Grouping

Concept Groupings	**Complete match n (%)**		**Partial match n (%)**	**No match n (%)**
	1-to-1	**1-to-many**		
Physiologic and Psychologic Assessments (n=20)	10 (50%)	8 (40%)	2 (10%)	
Assessment of Contextual Factors (n=5)	3 (60%)	1 (20%)		1 (20%)
Assessment of External Safety Considerations (n=5)	1 (20%)	4 (80%)		
Nursing Care Interventions (n=12)	2 (16.6%)	5 (41.7%)	5 (41.7%)	
Patient/Family Education (n=4)	2 (50%)	1 (25%)	1 (25%)	
Referrals and collaboration (n=2)		1 (50%)	1 (50%)	
Personal safety accessories (n=4)		3 (75%)		1 (25%)
Equipment safety measures (n=11)	1 (9.1%)	8 (72.7%)		2 (18.2%)
Total (% total)	**19 (30.2%)**	**31 (49.2%)**	**9 (14.3%)**	**4 (6.3%)**

3.7 Details of Concepts and Mappings

A matrix style presentation of the terms found within the five fall and injury prevention guidelines is presented in Tables 3.6 to 3.13. These tables show the guideline concept and mapping results. Mappings are shown with up to three columns for each term. If more than three terms were needed to express a concept, then the concept was separated into components found on individual column rows.

The concept mapping revealed that the physiologic and psychologic assessments within ICNP had largest proportion of representation (31.7%). Body system assessments have pre-coordinated terms in ICNP that describe the act of assessing as well as the subject of assessment. This was not the case when mapping equipment or aids where the subject or object was available, for example 'bed rail' but was not already paired with an action that the nurse would perform on it, such as assessing or lowering it. Patient and family education on the topic of fall prevention already has ICNP terms that are pre-coordinated to express both the action of teaching or educating, the target of the teaching, as well as the topic of the teaching.

Table 3.6 Concept Mapping for Physiologic and Psychologic Assessments Terms

Extracted Concept Phrase	Mapped term 1	Mapped term 2	Mapped term 3	Type of Match	Complete-ness
Altered mental status (Assess for)	Assessing Cognition (10025883)			One-to-one	Complete
Cardiac arrhythmias (Assess for)	Assessing Circulatory System (10050193)	Arrhythmia (10002536)		One-to-many	Complete
Continence – bladder (Assess for)	Assessing Urinary Continence (10030781)			One-to-one	Complete
Continence – bowel (Assess for)	Assessing Bowel Continence (10030558)			One-to-one	Complete
Depression (Assess for)	Assessing Depressed Mood (10026055)			One-to-one	Complete
Dizziness and vertigo (Assess for)	Assessing Dizziness (10045917)			One-to-one	Complete
Fear of falling (Assess for)	Assessing Fear (10024267)	Falling (10007520)		One-to-many	Complete
Feet (Assess for)	Assessing (10002673)	Foot (10008155)	Bilateral (10027597)	One-to-many	Complete
Frequent falls (Assess for)	Assessing (10002673)	Fall Rate (10037708)		One-to-many	Complete
High risk medications (Assess for…)	Assessing Medication Side Effect (10039087)	Assessing Response to Medications (10007182)		One-to-many	Complete
Impaired gait or mobility (Assess for)	Assessing Mobility (10030527)			One-to-one	Complete
Nutritional status (Assess)	Assessing Nutritional Status (10030660)			One-to-one	Complete
Orthostatic hypotension (Assess for)	Assessing Circulatory System (10050193)	Hypotension (10009534)	Standing (10018775)	One-to-many	Complete
Post-Fall Reassessment and Cause Analysis	Assessing Risk for Falls (10023520)				Partial
Presence and appropriate treatment of osteoporosis (Assess for)	Osteoporosis Prevention (10037501)	Evaluating Musculoskeletal Status (10034030)		One-to-many	Complete
Recent fall incident (Assess for)	Assessing (10002673)	Fall (10007512)		One-to-many	Complete
Standardized assessment of falls risk/factors	Assessing Risk for Falls on Admission (10037435)			One-to-one	Complete
Syncope (Syncope)	Assessing Consciousness (10050186)			One-to-one	Complete
Vitamin D and calcium supplementation requirements (Assess for)	Assessing (10002673)	Nutritional Supplement (10037016)			Partial
Visual impairment (Assess for)	Assessing Vision (10050138)			One-to-one	Complete

Table 3.7 Concept Mapping for Assessments of Contextual Factors

Extracted Concept Phrase	Mapped term 1	Mapped term 2	Mapped term 3	Type of Match	Complete-ness
Cultural components (Assess for)	Assessing Cultural Beliefs (10024233)			One-to-one	Complete
Inadequate support networks (Assess for)	Assessing Social Support (10024298)			One-to-one	Complete
Low income (Assess for)	Assessing Financial Status (10037950)			One-to-one	Complete
Social Determinants of Health (Assess for)					No match
Social isolation (Assess for)	Assessing (10002673)	Social Isolation (10018389)		One-to-many	Complete

Table 3.8 Concept Mapping for Assessments of External Safety Considerations

Extracted Concept Phrase	Mapped term 1	Mapped term 2	Mapped term 3	Type of Match	Complete-ness
Appropriateness of bed rails (Assess for)	Assessing (10002673)	Bed Rail (10003201)		One-to-many	Complete
Appropriateness of hip protector (Assess for)	Assessing (10002673)	Hip Protector (10041573)		One-to-many	Complete
Assistive devices (Assess for)	Assessing (10002673)	Assistive Device Therapy (10039158)		One-to-many	Complete
Environment (Assess for)	Assessing Environmental Safety (10039751)			One-to-one	Complete
Footwear (Assess for)	Assessing (10002673)	Clothing (10002589)	Foot (10008155)	One-to-many	Complete

Table 3.9 Concept Mapping for Nursing Care Interventions

Extracted Concept Phrase	Mapped term 1	Mapped term 2	Mapped term 3	Type of Match	Complete-ness
Accompaniment in the bathroom	Assisting With Toileting (10025331)				Partial
Care Planning	Care Planning (10035915)			One-to-one	Complete
Epley maneuver or vestibular rehabilitation (Perform)	Improved balance (10047348)	Body Process Intervention (10034228)			Partial
Mobilization (Regular)	Scheduling (10017528)	Managing Regime (10011673)	Mobilising (10012120)	One-to-many	Complete
Night sedation (Avoid)	Medication Schedule (10043171)	Managing Medication Side Effect (10021837)			Partial
Restraints (Avoid use of unless necessary)	Avoiding (10003077)	Restraint (10017164)		One-to-many	Complete
Risk to care team members (Communicate)	Documenting (10006173)	Risk for Fall (100151220)		One-to-many	Complete
Rounding (Scheduled)	Scheduling (10017528)	Assessing (10002673)			Partial
Safe patient handling practices	Implementing Safety Regime (10036565)	Handling (10041830)		One-to-many	Complete
Toileting (Regular)	Scheduling (10017528)	Toileting (10019807)		One-to-many	Complete
Universal Falls Precautions					Partial
Urinalysis (Perform)	Assessing Urine (10050164)			One-to-one	Complete

Table 3.10 Concept Mapping for Education

Extracted Concept Phrase	Mapped term 1	Mapped term 2	Mapped term 3	Type of Match	Complete-ness
Call light/bell use (Return demonstration of)	Assessing Response to Teaching (10024279)	Call System Device (10003825)		One-to-many	Complete
Falls risk and interventions (Educate family on)	Teaching Family About Fall Prevention (10040269)			One-to-one	Complete
Falls risk and interventions (Educate patient on)	Teaching About Fall Prevention (10040253)			One-to-one	Complete
Surroundings (Familiarize patient with)	Teaching About Environmental Safety (10044937)				Partial

Table 3.11 Concept Mapping for Referrals and Collaboration

Extracted Concept Phrase	Mapped term 1	Mapped term 2	Mapped term 3	Type of Match	Complete-ness
Appropriate services post-discharge from hospital (Referral to)	Referring to Home Care (10038371)				Partial
Appropriate therapist for inpatient care (Referral to)	Referring to Physical Therapy (10024019)	Referring to Occupational Therapy (10026415)	Respiratory Therapy (10037085)	One-to-many	Complete

Table 3.12 Concept Mapping for Personal Safety Accessories

Extracted Concept Phrase	Mapped term 1	Mapped term 2	Mapped term 3	Type of Match	Complete-ness
Hip protector devices (Utilize)	Promoting Use of Hip Protectors (100414594)	Implementing (10009840)		One-to-many	Complete
Nonslip footwear available/on patient (Keep)	Applying (10002464)	Clothing (10002589)	Foot (10008155)	One-to-many	Complete
Personal belongings are within reach (Ensure)					No match
Sensory aids within patient reach (Ensure)	Promoting Walking Using Device (10037636)	Promoting use of glasses (10037643)	Implementing (10009840)	One-to-many	Complete

Table 3.13 Concept Mapping for Equipment Safety Measures

Extracted Concept Phrase	Mapped term 1	Mapped term 2	Mapped term 3	Type of Match	Complete-ness
Area is uncluttered/free from trip hazards (Ensure)	Effective Environmental Safety (10030233)			One-to-one	Complete
Bed and chair alarms (Utilize)	Implementing (10009840)	Fall Safety Alarm (10041518)		One-to-many	Complete
Bed in low position when not transferring (Maintain)	Bed (10003168)	Height (10009812)	Low (10011438)	One-to-many	Complete
Bed rails (bottom) down unless assessed otherwise	Bed Rail (1003101)	Assessing (10002673)	Lower (10011440)	One-to-many	Complete
Bed wheel locks engaged (Maintain)	Bed (10003168)	Immobilizing device (10009770)		One-to-many	Complete
Call light/bell within reach (Maintain)	Implementing (10009840)	Call System Device (10003825)		One-to-many	Complete
Floors clean and dry (Maintain)	Cleaning (1004444)	Environmental Process (10007009)		One-to-many	Complete
Handrails in obvious locations (Have)	Implementing (10009840)	Hand Rail (10008657)		One-to-many	Complete
Nightlights or supplemental/purpose lighting (Use)					No match
Non-slip floor mats (Utilize)					No match
Wheelchair wheels locked when stationary (Maintain)	Wheelchair (10021052)	Immobilizing device (10009770)		One-to-many	Complete

Chapter 4: Discussion

In this chapter a discussion of the ability of ICNP to represent terms and concepts used to detail the assessments and interventions for fall and injury prevention best practices is presented, followed by a discussion of the findings of consultation with experts. Links to Matney's Theory of Wisdom in Action framework (2015) are made to ground the project within its theoretical foundation and a presentation of future directions for terminology extraction and mapping is presented.

4.1 Mapping Completeness in Other Works

In this project, 79.4% of terms were completely mapped (30.2% 1-to-1, and 49.2% 1-to-many), 14.3% were partially mapped, and only 6.3% were not mapped. In comparison to other mapping exercises, Kang, Kim, Lee, Jung, & Kim (2015) identified in their study of 545 home care terms that 20% were completely mapped and the remaining 80% were incompletely mapped. Kang et al. deemed that concepts were completely mapped if one ICNP term matched to a concept. It is not known what proportion of their concepts could be completely mapped using more than one ICNP term (i.e., one-to-many). In the project reported in this paper, 30% of terms could be completely mapped to ICNP terms using only one term, therefore the findings are similar to Kang et al.

In their analysis of terms used to describe care provided to adult patients with depression, Dontje & Coenen (2011) found that 93% of their concepts were complete or partial semantic matches, while 80% showed a partial semantic match. Matches were classified by either being a semantic or lexical match, with a further classification of whether the match was complete, partial, or not matched. Their analysis showed that 7% of concepts could not be

matched semantically, and 23% did not have a lexical match. Mapping in this project was not classified by semantic or lexical, so an exact equivalence cannot be determined. Their finding of 7% of concepts with no semantic match is similar to the findings of this project in which 6.3% of concepts had no match. This suggests that there is a similar level of representation among nursing topics in what concepts can be partially or incompletely expressed in ICNP terms. In this project, and in that by Dontje & Coenen (2011) less than 10% of terms could not be mapped, whereas in the work by Kang et al. (2015), the authors did not report any terms that could not be at least partially mapped to ICNP terms. This could be due to the content areas of the studies. Homecare and depression management are well-described in nursing, while the guidelines that were identified for the project reported in this paper, were not exclusively created/generate by nursing organizations. The guidelines used for this project were interdisciplinary, involving physician and allied professions as well as healthcare quality organizations.

When looking at these results in the context of the Theory of Wisdom in Action (i.e., 7% had no matches at all), nurses cannot adequately express the assessments or interventions that they are making or doing unless new terms are created for the ICNP. Which means that these aspects of nursing would not be captured in a manner that would allow for comparison between practice areas or between implementations of best practice (e.g., before and after a change in policy or procedure). The lack of information may prevent us from furthering the knowledge and therefore wisdom in this practice area. Strudwick and Hardiker (2016) strongly encourage organizations that have implemented ICNP or other standardized terminologies to use the data to further nursing practice, and presumably wisdom. This cannot be fulfilled without an adequate representation of a practice area within the terminology.

4.2 Links Between Theory of Wisdom in Action and Representation in ICNP

By utilizing evidence-informed assessments and interventions in the care of patients to prevent falls and injury from falls, nurses are using information and knowledge to inform their clinical care. Evidence-informed assessments and interventions are examples of *Wisdom into Action;* therefore, when nurses utilize a fall and injury prevention catalogue of terms within ICNP to structure their documentation and care, quality of care to patients improves. Nurses could do this by using these ICNP terms that are integrated into an electronic health record (EHR) clinical decision support and documentation frameworks. Then nursing leaders can help to support the translation of knowledge into wisdom for nurses to enact within their care environments.

4.3 Representation of Fall and Injury Prevention Concepts Within the Terminology

Despite fall and injury prevention being a well-established part of care for inpatient and elder care nursing, the terms used to express the assessments undertaken or the interventions put into place are only partially expressed by the current ICNP data set. There are many possible reasons for this. For example, the concepts in the guidelines might be commonly used in other professions, e.g., physical therapy or occupational therapy, leading nursing to not have clearly articulated the concept within our own lexicon. A contributing factor to this finding could be that fall prevention has been so long established as nursing practice, practitioners may have not felt the need to assign coded terms since the concepts are thought to be well understood. Grubel and Thurston were publishing on falls as early as 1957, indicating that falls have been discussed in nursing for almost 60 years (as cited in Currie, 2006).

While nurses have long been concerned about fall and injury risk assessment and prevention of falls and related-injuries (Currie, 2006) it has only been within the last twenty years that quality and patient safety initiatives have started to address this issue as a broad healthcare problem (Idvall et al., 1997; Institute of Medicine, 2000). In order for these important interventions to be recognized as important nursing work they need to be expressed in clear, concise terms. Having an ICNP catalogue in which these concepts can be explicated will help to ensure that nurses can detail the assessments and interventions that they are undertaking. In turn, this can assist nurses to use the information and knowledge about fall and related-injuries to gain wisdom to help guide their practice. A clear expression of the information helps nurses move toward ensure the visibility of nursing work. As Clark & Lang (1992, p. 109) note, "if we cannot name it, we cannot control it, finance it, teach it, research it, or out it into public policy." By ensuring that this important nursing practice is named and framed in a way that it's easily explained, the greater likelihood that fall and injury prevention remain taught, researched, grounded into policy, and enacted in the care of a patient.

4.4 Content about Assessment for Social Determinants of Health

Raphael (2009) defines the Social Determinants of Health (SDOH) to be the following parameters: Aboriginal status, disability, early life, education, employment and working conditions, food insecurity, health services, gender, housing, income and income distribution, race, social exclusion, social safety net, and unemployment and job security. Some parameters related to these social determinants of health were found directly in the guidelines, such as assessing for social supports, financial, and cultural components and these concepts were found as one-to-one mappings in ICNP. The fall prevention guidelines used for this project appear to

currently be conceptualized on individual and environmental aspects of a person, but do not account for personal life context, history, or other relevant aspects of a person. It would be beneficial to have additional social determinants of health parameters included in fall prevention guidelines, to ensure that nurses are able to fully document their assessments of these factors. If computerized documentation systems allowed for additional information about these risk factors to be captured in detail, with the ability to be mapped to standardized terms, then information could be gained about risks connected to the SDOH. Ancker, Kim, Zhang, Zhang, & Pathak (2018) express excitement that informatics specialists are beginning to investigate ways to capture and study SDOH information to improve the quality of care to patients.

4.5 Future Directions for Falls and Injury Prevention Within Electronic Health Records

As EHRs become more developed and widespread across healthcare organizations an opportunity exists for fall and injury prevention information to be embedded within structured documentation. Choi & Choi (2016) conducted a pilot study to gather data about fall and injury prevention assessments and interventions and fall rates from documentation conducted in an EHR. By modeling patient risks for falls and injuries they were able to visually represent suitable interventions and desired outcomes related to each risk factor. This was then translated into computable information using structured documentation to enable calculation of assessment rates, risk factors, and fall rates. They identified that the rate of reduction of fall rates could not be calculated by their small sample size, but that the ultimate goal of computing nursing assessment and intervention in this way would be to eventually realize the patient safety benefits through larger studies.

4.6 Universal Falls Precautions

Guidelines by Agency for Healthcare Research and Quality (Ganz et al., 2013) and (Safer Healthcare Now! (2013) recommend "universal fall precautions", and this was found elsewhere in the literature as a recurring theme. This term could not be mapped as a discrete concept, but rather was coded as a "one-to-many" match since it was implied in the literature that many of the concepts found elsewhere could be considered as part of the universal fall precautions category. The guideline by Safer Healthcare Now! (2013) indicates that the acronym S.A.F.E. is a form of universal fall precautions. The components that they define are a Safe environment, Assist with mobility, Fall-risk reduction, and Engage patient and family. This signals a need for future guidelines and literature to clearly define which interventions are thought to be universal. The guideline from the Agency for Healthcare Research and Quality (Ganz et al., 2013) lists a very different set of interventions than the other guidelines. The list of recommended actions in this guideline is much more detailed and contains very specific interventions that the nurse could enact as part of universal precautions for falls. This indicates that despite the name, the components considered to be 'universal' are not standardized across guidelines. This indicates a need for further work to define a basic set of interventions that are appropriate for universal usage, to ensure that nurses can be confident of the interventions that they are enacting for their patients.

4.7 Implications for Nursing Practice

The creation of a fall and injury prevention catalogue can benefit nursing practice by articulating evidence-informed assessments and interventions in a standardized terminology that is understood by nurses. As ICN points out, a topic-based catalogue can increase uptake of best

practice guidelines by nurses in clinical practice (International Council of Nurses, 2008). This has the potential to facilitate consistency in assessments performed and interventions undertaken to prevent falls and injuries from falls, which can lead to a decrease in adverse outcomes for patients. If this catalogue is embedded into an electronic health record as suggested, assessments with a linked algorithm to suggest appropriate interventions, this can aid the nurse in clinical decision-making.

4.8 Implications for Nursing Research

The utilization of a catalogue of ICNP fall and injury prevention terms can help facilitate comparison of fall rates, effective and ineffective interventions, and fall risk factors across sites and settings. Since ICNP terms are computable, this can facilitate extraction from electronic health record databases to analyze risk factors and interventions for fall prevention. Furthermore, this research can be extended to further the knowledge base about nursing sensitive patient outcomes by investigating falls and injuries in relation to other organizational processes such as staffing and skill mix.

4.9 Implications for Nursing and Healthcare Policy

A catalogue of nursing-specific terms for fall and injury prevention can assist in the development of clear nursing practice guidelines. By articulating these concepts in ICNP terms within policy, nursing leaders can help to solidify the clarity of the understanding of the concept. Many of the assessments and interventions for fall and injury prevention can be completed by nurses in any inpatient healthcare setting, so this catalogue could help to inform national and international best practice guidelines. The work of organizations such as the Canadian Nurses

Association (CNA) and the International Council of Nurses (ICN) could help promote and support some of this work as it did for C-HOBIC (Hannah, White, Nagle, & Pringle, 2009). The high percentage of recommended actions that were unique to only one guideline suggests that different bodies of research and evidence are being used to inform guideline and policy, whereas the creation of an international harmonized catalogue would ensure that the best possible evidence from every source could contribute to the practice and support safe care for patients.

4.10 Strengths and Limitations of This Project

Strengths of this project include a broad base of established fall and injury prevention guidelines that were compiled to create a list of concepts for mapping. This helps to ensure representation of a wide variety of philosophies and approaches to fall and injury prevention in a nursing terminology catalogue. This also helps to limit any bias toward particular interventions or assessments. A limitation of this project is that a greater number of guidelines were not used, as a higher number may have led to additional parameters being found to add to the robust list of assessments and interventions. A further strength of this project is having peer review by both a nurse who is familiar with the process of terminology mapping, as well as another healthcare professional who is an expert in fall prevention content. This helped to ensure that the process of the mapping process was reviewed as well as the validity of the concept representation in the mapping results. A limitation related to this is that additional reviewers could have added additional perspectives.

4.11 Directions for Future Work

Next steps for this project would be to validate the catalogue of terms with current practice in centers where fall and injury prevention practices are established. This would involve ensuring that concepts being used successfully in practice are not omitted from the catalogue of terms. Analysis would need to be completed to ensure that practices not found in the traditional body of work for fall and injury prevention were evidence-informed prior to including them.

After confirming concepts and evidence with practice for fall and injury prevention, optimization of the catalogue of terms is the next progression. This would be twofold: to combine terms that have been found to have a one-to-many mapping to create one ICNP term to fully communicate the concept, and to create new terms to enhance the completeness of those mappings found to be incomplete. These steps would add validated terms to the ICNP terminology, to strengthen the ability of the terminology to express the practice of nursing in the care of fall and injury prevention. This would ensure that the terms used in future catalogues and terminologies is more inclusive and concise.

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