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**Title: An Umbrella Review of Clinical Practice Guidelines for the Management of Patients with Hip Fractures and a Synthesis of Recommendations for the Pre-Operative Period**

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## Abstract

**Aim.** The aim of this review was to locate, retrieve, and critically appraise practice guidelines for the management of hip fractures. Given increasing evidence that the early recognition and management of these fractures is integral to achieving optimal outcomes, recommendations for the pre-operative period were synthesised and compared.

**Background.** Hip fractures are associated with high rates of adverse outcomes and high healthcare costs which has resulted in the development of multiple practice guidelines to inform clinical decision-making.

**Design.** An umbrella review of practice guidelines was conducted which included a critical appraisal using the AGREE-II instrument and a synthesis of pre-operative management recommendations.

**Data Sources.** Multi-phased search for practice guidelines published in English using 3 bibliographic databases; 3 guideline network websites; and 3 healthcare safety and quality organisation websites with no date limit applied. Search was supplemented by contacting front-line knowledge users and content experts.

**Review Methods.** Steps for evidence-informed practice were followed: form question then search for, appraise, and synthesise the evidence.

**Results.** Five practice guidelines were appraised revealing significant variability in quality. The largest variability was in 'rigour of development'. Recommendations for pre-operative management were grouped into six categories: timing of surgery, expedited patient management, identification and treatment of correctable co-morbidities, pain management, preventative measures, and multidisciplinary management.

**Conclusion.** Results of this review illustrate that not all practice guidelines are of equal quality. Given the costs associated with the development and maintenance of high-quality practice guidelines, such work may be more efficiently completed through international collaborations and then adapted for national and regional healthcare contexts.

*Keywords:* clinical practice guideline, emergency nursing, evidence synthesis, hip fractures, practice guideline, pre-operative nursing care, umbrella review

## Summary Statement

### **Why is this review needed?**

- Recognition of the impact of hip fractures on patients and their families, as well as the healthcare system has resulted in the generation of multiple practice guidelines aimed at optimising outcomes.
- The quality of clinical practice guidelines on the same topic may vary greatly so it is important to critically appraise the practice guidelines and compare their recommendations.
- This review outlines a process for conducting an umbrella review of clinical practice guidelines. Currently an explicit process is not available for conducting an evidence synthesis of this type.

### **What are the key findings?**

- Appraisal of five clinical practice guidelines revealed considerable variability in quality, the largest amount of variability was in 'rigour of development'.
- Recommendations for pre-operative management were grouped into six categories: timing of surgery, expedited patient management, identification and treatment of correctable co-morbidities, pain management, preventative measures, and multidisciplinary management.
- Majority of recommendations for the pre-operative management of patients with hip fractures are based on expert opinion or consensus and largely focus on identification of problems rather than their management.

### **How should the findings be used to influence policy/ practice/ research/ education?**

- This review highlights the work and resources required to create and maintain a high-quality practice guideline. A more efficient approach might be to conduct such work through an internationally-collaborative network.

- At a national or regional level, work is needed to adapt high-quality clinical practice guidelines to the specific healthcare context and establish indicators to monitor their effect on practice.
- Nurses have a role to play not only in developing practice guidelines for the management of patients with hip fractures but also in translating recommendations into more specific and measurable practice standards.

An Umbrella Review of Clinical Practice Guidelines for the Management of Hip Fractures with a  
Synthesis of Recommendations for the Pre-Operative Period

### **Introduction**

The evolution of evidence-informed healthcare and the need to improve healthcare quality as well as decrease costs has precipitated the development of various clinical decision-aids (De Bleser et al., 2006; Lawal et al., 2016). According to the Institute of Medicine (US) Committee on Standards for Developing Trustworthy Clinical Practice Guidelines (IOM, 2011), the most methodologically rigorous and transparent of these decision-aids is the clinical practice guideline (CPG); however, not all CPGs are created equally (Graham & Harrison, 2005; IOM, 2011; S. H. Woolf, Grol, Hutchinson, Eccles, & Grimshaw, 1999). Clinical practice guidelines are "statements that include recommendations intended to optimize patient care. They are informed by a systematic review of evidence and an assessment of the benefits and harms of alternative care options" (IOM, 2011, "Purpose and Updated Definition", para 1). To exemplify rigor of development, high-quality CPGs also need to provide details about: (a) their scope and purpose with information about the overall aim, specific health questions and target population; (b) the methods used to generate recommendations; (c) the explicit link between each recommendation and its supporting evidence; (d) the process established for reviewing and updating the practice guideline; (e) relevant professional groups and stakeholders involved in the process and how the views and preferences of the target population were incorporated; and (f) the measures taken to ensure editorial independence to minimise potential biases or conflicts of interest (Brouwers et al., 2010; IOM, 2011). Lastly, a high-quality CPG presents recommendations clearly so they are easily identifiable, and describes factors contributing to the applicability of the CPG, including the availability of tools to assist with implementation of the

recommendations as well as information on resource implications and criteria for monitoring (Brouwers et al., 2010; IOM, 2011). Because the recommendations put forward in these CPGs may differ, in part, due to the quality of the process used to generate them (Graham & Harrison, 2005; Oxman, Glasziou, & Williams, 2008; P. Shekelle, Eccles, Grimshaw, & Woolf, 2001), it is important to critically appraise a practice guideline prior to examining the recommendations contained within it (Brouwers et al., 2010; IOM, 2011).

This paper summarises an umbrella review (a review of reviews) conducted to examine the quality of available CPGs for the management of patients with hip fractures and to synthesise the recommendations put forward for the pre-operative period. As an emerging form of evidence synthesis, umbrella reviews help support the uptake of practice recommendations that reflect the best available evidence when multiple CPGs are available (Brouwers et al., 2010; Graham & Harrison, 2005; Grant & Booth, 2009).

## **Background**

Hip fractures have been described as one of the most serious of osteoporotic fractures and musculoskeletal injuries world-wide (Johnell & Kanis, 2006; A. Woolf & Pfleger, 2003). Risk of experiencing a hip fracture increases exponentially with age, especially in developed countries (Cooper et al., 2011; Johnell & Kanis, 2006). As other countries continue to develop, the average life expectancy increases, and the proportion of older people grows worldwide the incidence of hip fracture is projected to increase (Cooper et al., 2011; Kannus et al., 1996; Melton III & Cooper, 2001). Adverse events, such as loss of independence, institutionalisation, and 1-year mortality rates of 20%, precipitate high costs, not only for the healthcare system but also for patients and their families (Cummings & Melton III, 2002; Haentjens et al., 2010; Martinez-Reig, Ahmad, & Duque, 2012). To avert such adverse events and optimise outcomes, a number



of CPGs have been developed that provide recommendations reflecting the best available evidence.

## **The Review**

### **Aim**

The aim of this review was to locate, retrieve, and critically appraise available clinical practice guidelines for the management of hip fractures. Given increasing evidence that the early recognition and management of these fractures is integral to achieving optimal outcomes (Clague, Craddock, Andrew, Horan, & Pendleton, 2002; Orosz et al., 2004; Vidal et al., 2009), recommendations for the pre-operative period were synthesised and compared to inform future research and support evidence-informed practice to optimise patient outcomes.

### **Design**

Umbrella review is a term that describes a review of synthesised evidence when more than one systematic review or clinical practice guideline exists on a practice issue (Grant & Booth, 2009). In an umbrella review, the quality appraisal as well as the data abstraction and synthesis takes place at the level of the synthesised evidence rather than the individual study. The information contained in the synthesised evidence is summarised, compared, and contrasted (Aromataris et al., 2015; Becker & Oxman, 2011; Grant & Booth, 2009). As an emerging research approach, the methods for conducting umbrella reviews are still evolving. To date the majority of umbrella reviews have involved systematic reviews, not clinical practice guidelines. Although methods for conducting an umbrella review of systematic reviews have been developed (Aromataris et al., 2015; Becker & Oxman, 2011), the procedure for conducting an umbrella review of clinical practice guidelines is less clear. The Agency for Healthcare Research and Quality (AHRQ; 2017) provides a template for synthesising multiple CPGs addressing the

same practice issue, however its scope is limited as no critical appraisal is conducted and only CPGs indexed in the National Guideline Clearinghouse database are included. Therefore, this umbrella review was undertaken following the steps for evidence-informed practice and included a multi-phased search of the literature to retrieve all relevant CPGs, a critical appraisal to determine the quality of the retrieved CPGs, followed by a synthesis and narrative analysis to compare the recommendations contained within the various practice guidelines. Based on this work, implications for future research and clinical practice were identified.

### **Search Methods**

A multi-phased process was used to locate and retrieve practice guidelines addressing the management of patients with a hip fracture that were published in English and provided recommendations for care during the pre-operative period. Exclusion criteria included: summaries or audits of CPGs and CPGs that focused on a secondary condition that could precipitate or complicate the management of patients with hip fractures (for example, osteoporosis, delirium, or venous thromboembolism). A date limit was not placed on the search strategy. The first phase of the search involved searching three bibliographic databases: PUBMED, MEDLINE, and CINAHL using a combination of keywords and Subject Headings, (see Figure 1). Next, the websites for three guideline networks: the National Guideline Clearinghouse, the Scottish Intercollegiate Guidelines Network (SIGN), and the Guidelines International Network (G-I-N) International Guideline Library were searched. Following this, a search was conducted of the websites for three international organizations with a mandate for improving healthcare safety and quality: the National Institute of Health and Care Excellence (NICE), the Australian Government National Health and Research Council, and the Bone and Joint Health Network Canada (BJHN-C). Front-line knowledge users (emergency nurses) and

content expert (corresponding author for the BJHN-C) were also contacted by telephone or email in an attempt to obtain additional practice guidelines. Finally, to locate the original sources of material, a hand-search was conducted of retrieved citations and gray (unpublished) literature that referenced practice guidelines or organisation websites. The search strategy was reviewed by R.W. (health sciences librarian) and completed independently by two reviewers (S.F. and M.H.; academic researchers with clinical background in emergency nursing). The last search was conducted in June 2017.

### **Search Outcome**

The process by which the citations were screened and practice guidelines retrieved is presented in a PRISMA Flowchart (see Figure 2; Moher, Liberati, Tetzlaff, Altman, & Group, 2009). A summary of the complete search strategy and outcome, including the audit trail, is provided in Table S1 (see supplemental information). The five clinical practice guidelines retrieved were developed by teams representing six countries: Australia and New Zealand (ANZ), Canada, Scotland, the United Kingdom (UK), and the United States of America (USA). Four of the five CPGs were developed by multidisciplinary groups, which included nurses (ANZHR, 2014; NCGC, 2011; NICE, 2017; SIGN, 2009; Waddell et al., 2010). Most guideline development groups only included one or two nurses, and none involved emergency nurses. The intended target users were stated to be primarily physicians and surgeons for one clinical practice guideline (American Academy of Orthopaedic Surgeons [AAOS], 2014), while the remainder were intended for multidisciplinary use (Australian and New Zealand Hip Fracture Registry [ANZHFR] Steering Group, 2014; National Clinical Guideline Centre [NCGC], 2011; National Institute for Health and Care Excellence [NICE], 2017; Scottish Intercollegiate Guidelines Network [SIGN], 2009; Waddell et al., 2010), three were also indicated for use by the public

(ANZHRF, 2014; NCGC, 2011; NICE, 2017; SIGN, 2009). Three of the five CPGs were first editions and two had been reviewed and updated. Another noteworthy characteristic of the included CPGs is their page length, which ranged from 45 (Waddell et al., 2010) to 664, plus an addendum of 280 pages (NCGC, 2011; NICE 2017). Table 1 presents a summary of the characteristics of the five clinical practice guidelines.

### **Quality Appraisal**

Each of the CPGs was independently appraised by three reviewers using the instrument developed by the AGREE Research Trust, an international group of guideline developers and researchers (Brouwers et al., 2010). The Enhancing the QUALity and Transparency Of health Research (EQUATOR) Network (2017) recommends the AGREE-II instrument for the appraisal of clinical practice guidelines. The Appraisal of Guidelines, Research, and Evaluation (AGREE) instrument was developed in 2003 to address the variability evident in the quality of clinical practice guidelines; an updated version, the AGREE-II, was released in 2010 (Brouwers et al., 2010). The instrument consists of 23 items that assess six quality domains: 'scope and purpose' (3 items), 'stakeholder involvement' (3 items), 'rigour of development' (8 items), 'clarity of presentation' (3 items), 'applicability' (4 items), and 'editorial independence' (2 items; Brouwers et al., 2010; IOM, 2011). An additional item prompts reviewers to provide an overall rating of the quality of the practice guideline. Each item is rated on a 7-point rating scale with 1 (strongly disagree) to 7 (strongly agree). Lastly, reviewers are asked whether they would recommend the CPG for use in practice (Brouwers et al., 2010).

Once the individual appraisals were completed, quality scores for each domain and for the overall rating item were automatically computed for each CPG by the My AGREE-II online platform (AGREE Next Steps Consortium, 2009). Quality scores were calculated by summing

scores for the items in each domain and scaling the summative score as a percentage of the maximum possible score for that domain (Brouwers et al., 2010). The three reviewers met to discuss the domain scores as well as any items with large scoring discrepancies (defined as a point difference of greater than 3). Reviewers were able to revise item scores based on the discussion when appropriate and domain scores were recalculated. Regardless of the quality score, all CPGs were included in the data abstraction and synthesis because the AGREE Research Trust has not set a domain score to quantify a guideline as high or poor quality (Brouwers et al., 2010). For the purpose of this review, the quality scores were used to inform the synthesis of recommendations and discussion about the quality of the practice guidelines.

### **Data Abstraction**

Data on the recommendations contained in the CPGs that addressed aspects of pre-operative management of hip fractures were extracted independently by two reviewers (S.F. and M.H.). In addition, the strength of the evidence supporting each recommendation was recorded. The results were then compiled and any discrepancies in the information retrieved were discussed and resolved.

### **Synthesis**

Recommendations from the five CPGs were examined to identify areas of commonality as well as areas of discrepancy. Through an iterative process, the recommendations were grouped into broader categories. The final step of the umbrella review was to integrate the quality appraisal of the CPGs with the recommendations.

## **Results**

### **Practice Guideline Quality Appraisal**

Mean scores for the 6 domains as well as the overall rating item for each of the five CPGs are presented in Table 2. The mean scores for the 23 items are presented in Table S2 (see supplemental information). The overall quality rating for the CPGs ranged from 22 to 89%. The CPG developed for the BJHN-C (Waddell et al., 2010) received the lowest overall rating, while the NICE (NCGC, 2011; NICE, 2017) CPG received the highest. An examination of the mean scores for the six domains indicates the lowest scores were generally obtained for 'applicability' (15 to 65%), while the highest scores were for 'scope and purpose' (61 to 94%). The domain with the largest variability in scores was 'rigour of development' (7 to 93%).

An examination of the five CPGs was conducted to identify their defining characteristics. The CPG disseminated by the AAOS (2014) received the highest domain score for 'rigour of development' (93%). Conversely, the domain with the lowest score was 'applicability' (15%). The high score for rigour of development reflects the details provided in the CPG about the methods used to search for the evidence and link it to the recommendations. However, this CPG received the lowest score for applicability due to lack of information regarding how to apply recommendations in practice (advice and/or tools) including facilitators and barriers, as well as monitoring criteria. Conversely, the CPG disseminated by NICE (NCGC, 2011; NICE, 2017) received the highest score among all the CPGs for 'applicability' (65%). Links to quick reference guides, algorithms, a guideline summary as well as a clinical pathway facilitate the uptake of the recommendations contained within this CPG. The NICE (NCGC, 2011; NICE, 2017) CPG also received the highest scores for the domains of: 'scope and purpose' (94%), 'clarity of presentation' (91%), and 'editorial independence' (75%). However, reviewers did find the NICE (NCGC, 2011; NICE, 2017) CPG challenging to review due to its length (664 pages, plus 280 page addendum). The CPG disseminated by ANZHFR (2014) received domain scores ranging

from 53 to 85%. The lowest domain score was for 'rigour of development' (53%), with low scores for systematic search methods reflecting that this CPG was adapted from the NICE (NCGC, 2011) CPG (parent CPG), with no attempt made to undertake additional searches for evidence (ANZHFR, 2014).

The SIGN (2009) CPG is noteworthy in terms of the high domain score attained for 'stakeholder involvement' (85%), which reflects the involvement of relevant professional groups as well as public representatives. Unfortunately, the SIGN (2009) received its lowest domain scores for 'rigour of development' (39%) and 'editorial independence' (28%). These low scores reflect that the methods for formulating the recommendations and information about conflicts of interest were no longer available due to the date of the last update of this CPG and SIGN policies for updating or destroying such information in a required timeframe (Scottish Intercollegiate Guidelines Network [SIGN], 2017). The BJHN-C (Waddell et al., 2010) CPG received the lowest scores for five of the six domains which reflects the lack of detail outlining the process for its development. It only received a score of 7% for 'rigour of development', as details about the process followed to generate the recommendations are not provided.

### **Synthesis of Recommendations and Narrative Analysis**

Recommendations addressing aspects of the pre-operative management of patients with hip fractures were grouped into six categories: timing of surgery, expedited patient management, identification and treatment of correctable co-morbidities, pain management, preventative measures, and multidisciplinary management. Table 3 summarises the aspects of care addressed by the recommendations and indicates the strength of the supporting evidence reported in each practice guideline. Differences were observed in the grading scheme used in the three CPGs that included ratings of the strength of the evidence, for example the AAOS (2014) and NICE

(NCGC, 2011; NICE, 2017) used the Grading of Recommendations Assessment, Development, and Evaluation (GRADE; Guyatt et al., 2011), while the SIGN (2009) used an 'ABCD' grading scheme. Although the labels applied to the various levels of evidence differ, the defining characteristics of the categories are similar. Using both systems the strength of evidence is rated based on the type of evidence (expert opinion to systematic review) and its quality (identified threats to validity; see Figure 3). However, it is noteworthy that in the SIGN (2009) CPG it is stated that most of the recommendations for emergency department management are based on a 1989 report by the Royal College of Physicians (James et al., 1989). In the ANZHRF (2014) CPG, the development group did not appraise the evidence rather they presented the strength of the evidence as reported in the parent CPG (NCGC, 2011). The strength of the evidence is also not provided in the BJHN-C CPG, instead the development group cited relevant references (Waddell et al., 2010). A noteworthy feature of the CPGs is that the majority of recommendations for the pre-operative management of patients with hip fractures are based on expert opinion or consensus (ANZHFR, 2014; NCGC, 2011; NICE, 2017; SIGN, 2009). However, a notable difference among the CPGs is the number of recommendations for the pre-operative period: only 8 in the AAOS compared to 20 in the BJHN-C (AAOS; Waddell et al., 2010).

A recommendation for timely access to surgery is included in each of the CPGs (AAOS, 2014; ANZHFR, 2014; NCGC, 2011; NICE, 2017; SIGN, 2009; Waddell et al., 2010). Although differences are evident in the wording of the recommendation, reducing the time to surgery (within 36 to 48 hours) is presented as an essential aspect of care and key to improving patient outcomes (AAOS, 2014; ANZHFR, 2014; NCGC, 2011; NICE, 2017; SIGN, 2009; Waddell et al., 2010). To facilitate this, a number of recommendations are aimed at improving the process of



care in the pre-operative period through 'expedited patient management' (such as, physician assessment within 1 hour of presentation) and the 'identification and treatment of correctable co-morbidities'. Because patients who sustain a hip fracture frequently have one or more co-morbid conditions, the presence of comorbidities has historically been used as rationale to delay surgery (AAOS, 2014; ANZHFR, 2014; NCGC, 2011; NICE, 2017; SIGN, 2009; Waddell et al., 2010). The development group for each CPG asserted that such delays are unnecessary and may adversely affect patient outcomes and proposed recommendations aimed at identifying and optimising correctable co-morbidities, including: anaemia, altered coagulation status due to anticoagulant therapy, fluid and electrolyte imbalance, metabolic derangement, cardiac arrhythmia ischaemia or failure, acute respiratory conditions, and exacerbation of chronic respiratory conditions (AAOS, 2014; ANZHFR, 2014; NCGC, 2011; NICE, 2017; SIGN, 2009; Waddell et al., 2010). Interestingly, the only co-morbidity that was highlighted in each of the CPGs was altered coagulation status. It was recommended that surgery not be delayed for patients receiving anticoagulation therapy with the reported strength of the evidence ranging from 'consensus/ expert opinion' (NCGC, 2011; NICE, 2017) to 'moderate' (SIGN, 2009). The majority of recommendations included in this category were limited to identification of potential correctable co-morbidities rather than their management. Two of the CPGs included a statement indicating that decisions about the treatment of co-morbidities should be based on the best judgement of the healthcare team (ANZHFR, 2014; NCGC, 2011; NICE, 2017).

Pain management was identified as a priority by all guideline development groups. A notable difference in the recommendations offered for the management of pain was in relation to the administration of regional analgesia (nerve block). The AAOS (2014) recommended administering regional analgesia as the preferred method for pre-operative pain management

which they indicated was based on strong evidence. Conversely, the use of nerve blocks was recommended as an adjunct rather than a first-line treatment in the other CPGs based on the need for specially trained personnel which may delay its initiation and increase the risk for adverse outcomes (ANZHFR, 2014; NCGC, 2011; NICE, 2017; SIGN, 2009; Waddell et al., 2010). Recommendations advising against the application of pre-operative traction were found in three of the CPGs, with two indicating moderate to strong supporting evidence (AAOS, 2014; SIGN, 2009).

Recommendations aimed at the implementation of measures to prevent commonly experienced complications pre- or post-operatively were found in each practice guideline. Similar to the recommendations addressing co-morbidities, the majority of recommendations were aimed at increasing awareness of potential complications rather than offering specific interventions. In two of the CPGs, reference was made to other separately published CPGs to address the management of common complications, such as delirium and venous thromboembolism (ANZHRF, 2014; NCGC, 2011; NICE, 2017). Interestingly, the CPG disseminated by the BJHN-C (Waddell et al., 2010) was the only CPG containing a recommendation pertaining to the use of urinary catheters. Based on findings from one single-site randomised open study (not blinded;  $n = 153$ ) published in 1992 that examined the length of time for return to normal bladder functioning, it was recommended that urinary catheterisation be avoided.

All CPGs include information emphasizing the importance of a multidisciplinary approach for the management of patients with hip fractures, although little attention is given to defining the composition of the care team. Interestingly, only the NICE (NCGC, 2011; NICE, 2017) CPG explicitly identifies the core professional groups, which were identified as: medicine,

nursing, physiotherapy, occupational therapy and social care. Two CPGs only recommend multidisciplinary involvement during the post-operative or rehabilitative periods (AAOS, 2014; SIGN, 2009), while three CPGs emphasise the importance of multidisciplinary involvement starting from the time of initial assessment (ANZHFR, 2014; NCGC, 2011; NICE, 2017; Waddell et al., 2010). Further, the ANZHFR (2014) and NICE (NCGC, 2011; NICE, 2017) guideline development groups assert multidisciplinary assessment and management is necessary to ensure a patient's fitness for surgery is rapidly optimised and to achieve optimal outcomes.

### **Discussion**

The results of this umbrella review illustrate that not all CPGs are created equally. Even though each of the CPGs addressed the same practice issue (i.e., management of patients with hip fractures), differences are evident in the aspects of care examined and the recommendations put forward. One explanation for these differences is the composition of the guideline development group. The AAOS (2014) CPG was developed by, and primarily for, physicians and surgeons while the other CPGs have a more multidisciplinary focus. The CPGs also differ in terms of the evidence provided to support the recommendations. Two of the appraised CPGs contain detailed information about the process used to retrieve the evidence and to appraise its quality (AAOS, 2014; NCGC, 2011; NICE, 2017). Although a similar process appears to have been used for the SIGN (2009), the supporting documentation was no longer accessible. The remaining two CPGs primarily relied on pre-existing materials, however the ANZHFR (2014) development group followed an explicit methodological process to adapt the recommendations from the parent CPG (NCGC, 2011) for the Australian/New Zealand healthcare context according to a framework developed by the ADAPTE Collaboration (The ADAPTE Collaboration, 2009). Our appreciation of the differences among the CPGs only become apparent

during the appraisal process using the AGREE-II instrument. These differences are important to consider prior to adopting a CPG for practice.

This umbrella review also helps highlight the work and resources (material, human, financial, time) required to create and maintain a high-quality practice guideline. These costs raise questions as to the need for five practice guidelines addressing the same practice issue. A more efficient approach might be to build on existing infrastructure and organizations (such as the AGREE Research Trust and the Guidelines International Network [G-I-N]) in order to establish an international network of healthcare professionals, researchers, and members of the public to conduct such work. Subsequent work would then be required at a national or regional level to adapt the recommendations contained in internationally-prepared CPGs to establish more specific and measurable directives or standards for clinical practice. The framework created by the ADAPTE Collaboration that is now being supported by the G-I-N Adaptation Working Group provides a foundation for such work (Guidelines International Network, 2016). However, such work will require a significant commitment by health research communities internationally.

Nurses have a role to play not only in the development of CPGs for the management of patients with hip fracture but also in translating recommendations to more specific and measurable practice standards. Many of the pre-operative recommendations contained in the CPGs are sensitive to nursing action, such as the assessment and management of patients' pain, cognitive status, and fluid and electrolyte balance (ANZHRF, 2014; NCGC, 2011; NICE, 2017; SIGN, 2009; Waddell et al., 2010). Because the majority of these patients present to an emergency department and a considerable portion of their pre-operative period may be spent in this area (Friedman, Mendelson, Kates, & McCann, 2008; Richardson & McMahon, 2009), emergency nurses need to be part of the development group. The utility of these CPGs will be

largely determined by the extent that the recommendations can be used to inform the establishment of indicators for monitoring and evaluating the care received by these patients (Ftouh, Morga, & Swift, 2011; P. G. Shekelle, MacLean, Morton, & Wenger, 2001; S. H. Woolf et al., 1999). According to S. H. Woolf and colleagues (1999), the principal benefit of CPGs is to improve the quality of care and help reduce the inconsistencies of care. Unfortunately, a weakness of many of the recommendations contained in the CPGs for the pre-operative period is that they merely identify potential problems (e.g., delirium, osteoporosis) rather than inform practice decisions.

This review is not without limitations. First, practice guidelines not written in English were excluded which introduces a potential bias. During the search for CPGs, two practice guidelines were excluded: one written in German and the other in Finnish. Second, challenges were encountered when attempting to combine quality ratings of the CPGs (AGREE-II) with the specific recommendations and level of supporting evidence from the various practice guidelines. The establishment of a formalized process for conducting umbrella reviews of CPGs will facilitate future evidence syntheses of this type. Currently, completion of such reviews are hampered by the fact that CPGs are poorly indexed in many of the bibliographic databases and a process for generating and interpreting a global quality rating is not available; each quality domain in the AGREE-II instrument is rated separately (Brouwers et al., 2010). Despite these limitations, strengths of this review include the completion of a multi-phased search for relevant CPGs, which resulted in the retrieval of CPGs from multiple countries; a systematic quality appraisal of the CPGs using the AGREE-II instrument; and a synthesis and narrative analysis of the recommendations for the pre-operative management of patients with hip fractures.

### **Conclusion**

This article outlines a process for conducting an umbrella review of clinical practice guidelines. Practice guidelines are developed to support evidence-informed practice, but not all CPGs are created equally and may not present the best, or most up-to-date, evidence. Recent news (September 15, 2017) of efforts to strengthen linkages between the global systematic review (Cochrane Collaboration) and practice guideline networks (Guidelines International Network) is exciting and may advance efforts to create internationally-collaborative CPGs that can be adapted for use at a national or regional level (Guidelines International Network, 2016). Due to the burden of hip fractures on patients and their families, as well as the healthcare system, it is important that practice recommendations move beyond merely identifying potential problems to offering directives for practice that can be measured and monitored. Nurses can make a significant contribution to advancing work in this area.

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*Figure 1.*

### Search Terms Used

Keywords:
Search 1
"hip fracture"
"hip fractures"
"proximal femoral fracture"
"proximal femoral factures"
"femoral neck fracture"
"femoral neck fractures"
Search 2
"clinical practice guideline"
"practice guideline"
"practice recommendations"
"consensus statement"
"evidence synthesis"
MeSH Terms and CINAHL Headings:
Search 1
Hip Fractures
Search 2
Practice Guideline

Figure 2.

PRISMA Flowchart of Literature Search

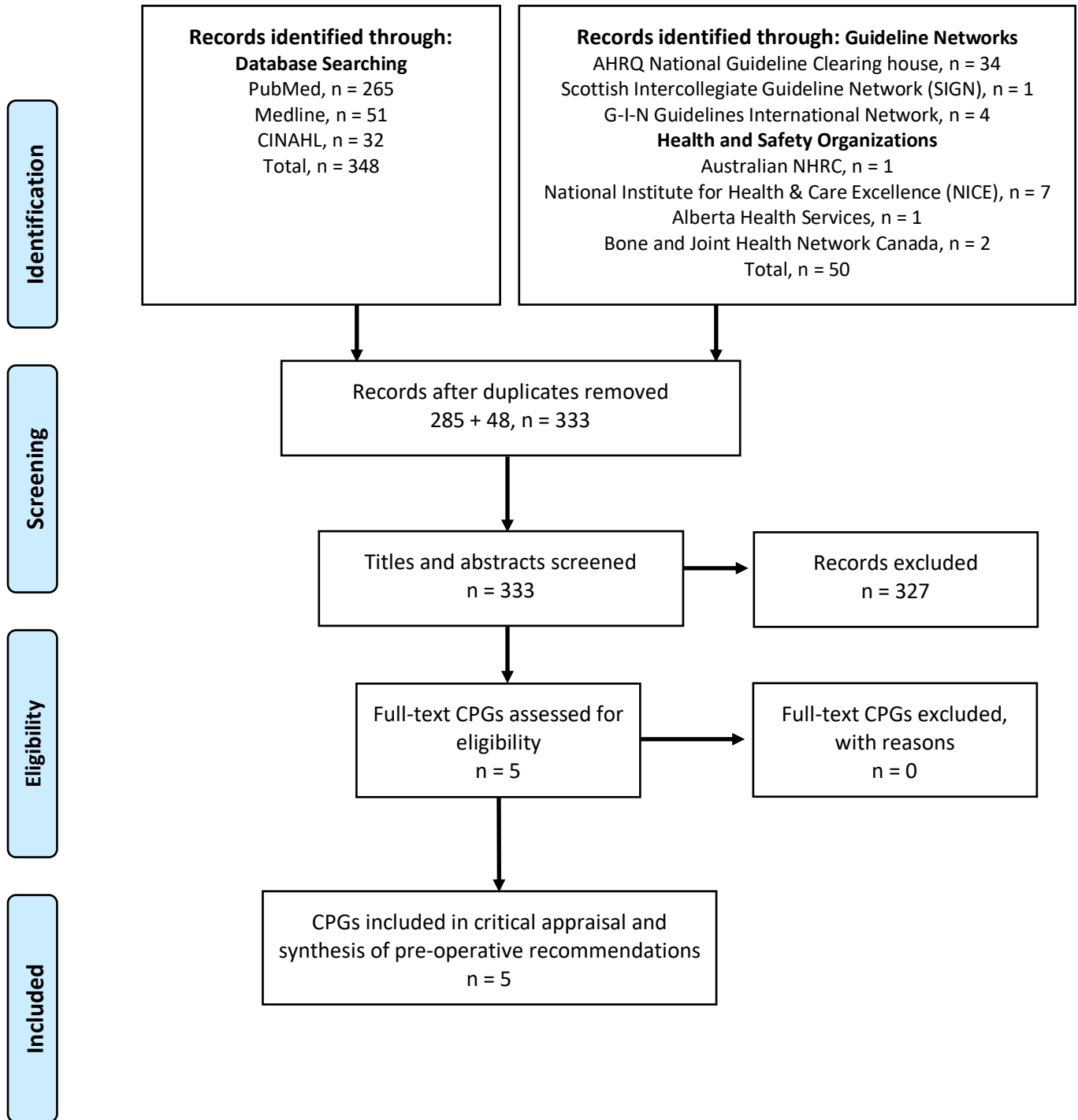
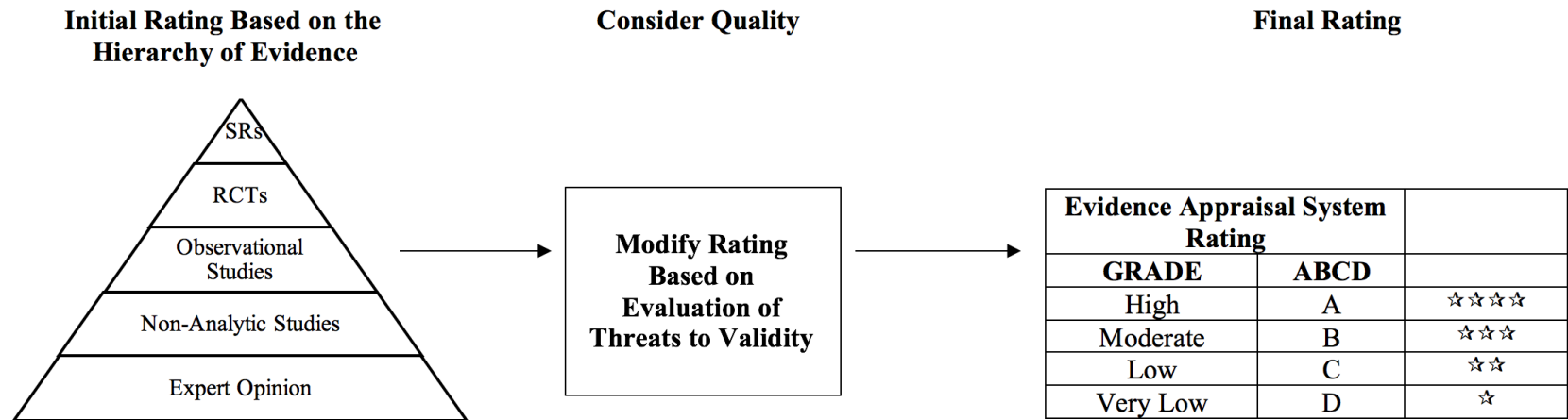


Figure 3.

Overview of Process Using the 'GRADE' and 'ABCD' Evidence Appraisal Systems



Abbreviations are as follows: 'SRs' - Systematic Reviews, 'RCTs' - Randomised Control Trials. Both grading systems also identify that the rating of the recommendation relates to the strength of the evidence and does not reflect the clinical importance of the recommendation and does not eliminate the need for expert judgements when formulating recommendations (Balshem et al., 2011; Guyatt et al., 2011; Scottish Intercollegiate Guidelines Network [SIGN], 2009).



Table 1

*Characteristics of the Hip Fracture Clinical Practice Guidelines Included in this Study*

<b>Clinical Practice Guideline</b>	<b>Country</b>	<b>Multidisciplinary Development</b>	<b>Primary intended users</b>	<b>Year Released</b>	<b>Funder Identified</b>	<b>Document Pages</b>
American Academy of Orthopaedic Surgeons, <i>Management of Hip Fracture in the Elderly</i>	USA	No	Orthopaedic surgeons and physicians	2014	Yes	521
National Institute for Health & Care Excellence, <i>The Management of Hip Fracture in Adults</i>	UK	Yes	Multidisciplinary (including public)	Released 2011 Updated 2017	Yes	664 with addendum 280
Australian and New Zealand Hip Fracture Registry, <i>Guideline for Hip Fracture</i>	ANZ	Yes	Multidisciplinary (including public)	2014	Yes	134
Scottish Intercollegiate Guidelines Network, <i>Management of Hip Fracture ... A National Clinical Guideline</i>	Scotland	Yes	Multidisciplinary (including public)	Released 1997 Updated 2002 Updated 2009	No	56
Bone and Joint Health Network, <i>Improving Time to Surgery ... Management of Hip Fracture Patients</i>	Canada	Yes	Healthcare professionals	2010	No	45

Country abbreviations are as follows: USA, United States of America; ANZ, Australia and New Zealand; UK, United Kingdom

Table 2.

*Domain Scores (%) Assessed Using the AGREE-II Instrument*

Domain	Guideline Development Group				
	AAOS (2014)	NICE (2017)	ANZHFR (2014)	SIGN (2009)	BJHN-C (2010)
1. Scope and Purpose	81	94	81	78	61
2. Stakeholder Involvement	51	70	70	85	24
3. Rigour of Development	93	83	53	39	7
4. Clarity of Presentation	83	91	85	74	57
5. Applicability	15	65	63	56	47
6. Editorial Independence	72	75	72	28	17
Overall Rating	72	89	61	44	22

Guideline development group abbreviations are as follows: AAOS American Academy of Orthopaedic Surgeons, NICE National Institute for Health and Care Excellence, ANZHFR Australia and New Zealand Hip Fracture Registry, SIGN Scottish Intercollegiate Guideline Network, BJHN-C Bone and Joint Health Network Canada.

Table 3.

*Aspects of Pre-Operative Management Addressed by Specific Recommendations and Supporting Strength of the Evidence*

	<b>AAOS (2014)</b>	<b>NICE (2017)</b>	<b>ANZHFR (2014)</b>	<b>SIGN (2009)</b>	<b>BJHN-C (2010)</b>
<b>Number Pre-Operative Recommendations</b>	<b>8</b>	<b>14</b>	<b>15</b>	<b>16</b>	<b>20</b>
<b>Aspects of Care</b>					
Timing of Surgery:					
within 48hrs	☆☆☆	-	-	-	?
on the day of, or day after presentation	-	☆☆	Z <sub>2</sub>	-	-
as soon as possible after presentation	-	-	-	☆☆	-
MRI if x-ray -'ve & fracture suspected	☆☆☆	☆	Z <sub>2</sub>	☆	-
Expedited Patient Management:					
assessment within 1hr of presentation	-	-	-	☆	Z <sub>2</sub>
referral assessments within 2hrs	-	-	-	-	?
transfer to ward within 2-4hrs	-	-	-	☆	Z <sub>2</sub>
Identify and Treat Correctable Co-Morbidities:					
anaemia	-	☆	Z <sub>2</sub>	-	-
altered coagulation status	☆☆	☆	Z <sub>2</sub>	☆☆☆	?
fluid and electrolyte imbalance	-	☆	Z <sub>2</sub>	☆	Z <sub>2</sub>
metabolic derangement	-	☆	Z <sub>2</sub>	-	-
cardiac arrhythmia, ischaemia, or failure	-	☆	Z <sub>2</sub>	☆☆	?
acute respiratory conditions	-	☆	Z <sub>2</sub>	-	-
exacerbation of chronic respiratory conditions	-	☆	Z <sub>2</sub>	-	-
Pain Management:					
regional analgesia as first-line treatment	☆☆☆☆	-	-	-	-
immediate pain assessment with timed reassessment	-	☆	Z <sub>2</sub>	☆	Z <sub>2</sub>
offer analgesia immediately on arrival	-	☆	Z <sub>2</sub>	☆	?
multimodal analgesia	-	☆	Z <sub>2</sub>	☆	?
do not use preoperative traction	☆☆☆	-	-	☆☆☆☆	?

Preventative Management:					
orientation, delirium prevention	-	☆☆☆	Z <sub>2</sub>	-	?
osteoporosis management	☆☆☆	»	»	-	?
skin care, pressure ulcer prevention	-	»	»	☆☆☆	Z <sub>2</sub>
nutritional status management	-	»	☆	-	?
venous thromboembolism prophylaxis	☆☆☆	»	»	☆☆☆☆	?
oximetry assessment and oxygen	-	-	-	☆☆	?
antibiotic prophylaxis	-	-	-	☆☆☆☆	?
avoid urinary catheterisation	-	-	-	-	?
Multidisciplinary Management:					
throughout care continuum	-	☆☆☆	Z <sub>2</sub>	-	?
specified time or patient population	☆☆☆☆	-	-	☆	-

Strength of the evidence supporting recommendation reported: ☆☆☆☆ - strong, ☆☆☆ - moderate, ☆☆ - low, ☆ - very low OR recommendations put forth based on consensus/ expert opinion; '»' indicates another approved CPG is referenced to address that aspect of care; '?' indicates the strength of the evidence was not stated; '-' indicates that aspect of care was not specifically addressed in the recommendations; 'Z<sub>2</sub>' indicates the evidence from another CPG was used to formulate the recommendation. Guideline group abbreviations are as follows: AAOS American Academy of Orthopaedic Surgeons, ANZHFR Australia and New Zealand Hip Fracture Registry, BJHN-C Bone and Joint Health Network Canada, SIGN Scottish Intercollegiate Guideline Network, NICE National Institute for Health and Care Excellence.

Table S1

*Search Strategy and Outcomes*

<p>Purpose: To identify clinical practice guidelines (CPG)s for the pre-operative management of patients who sustain a hip fracture.</p>	
<p>Inclusion criteria: Hip fracture CPGs in the English language.</p>	
<p>Exclusion criteria: Summaries or audits of practice guidelines; CPGs which focus on a condition that may precipitate or complicate hip fractures or their management (for example, osteoporosis, delirium, or venous thromboembolism); CPGs that do not include the pre-operative period.</p>	
<p>Database Searches</p>	
<p>Keywords:</p> <p>Search 1 "hip fracture" "hip fractures" "proximal femoral fracture" "proximal femoral fractures" "femoral neck fracture" "femoral neck fractures"</p> <p>Search 2 "clinical practice guideline" "practice guideline" "practice recommendations" "consensus statement" "evidence synthesis"</p>	<p>MeSH and CINAHL Headings (exploded):</p> <p>Search 1 Hip Fractures exploding included: femoral neck fracture (MEDLINE and PUBMED), hip fracture, stress (CINAHL)</p> <p>Search 2 Practice Guideline (MEDLINE and CINAHL) Practice Guideline [publication type] (PUBMED) Practice Guideline as a topic (PUBMED)</p>
<p>Search Strategy:</p>	

1) Combined using Boolean operator OR: Hip Fractures [MeSH Term or CINAHL Heading] (including all subheadings) with keywords.

2) Combined using Boolean operator OR: Practice Guideline [MeSH Terms for database or CINAHL Heading] (including all subheadings) with keywords.

3) Combined search 1 & 2 using Boolean operator AND, then apply limit of English and human.

#### Database Search Outcome:

##### PUBMED:

Of the 265 citations retrieved: AAOS CPG, 1 link to NICE CPG, and summary of CPG published by Mak, Cameron, & March (2010) retrieved. All other articles met one or more exclusion criteria, including 1 article discussing SIGN CPG, and multiple articles discussing or summarising the AAOS CPG, NICE CPG, or CPGs for other conditions (such as, osteoporosis).

##### MEDLINE:

Of the 51 citations retrieved: AAOS CPG. All other articles met one or more exclusion criteria, including NICE guideline summary (not full CPG), and some duplicates from PUBMED search.

##### CINAHL:

Of the 32 citations retrieved: Although some duplicates from PUBMED and MEDLINE searches, all citations retrieved met one or more exclusion criteria.

#### Guideline Network Searches

##### National Guideline Clearinghouse:

Search using keyword "hip fracture" retrieved 34 citations. Upon reviewing titles, only 1 citation relevant:

AAOS Management of hip fracture in older people: A national clinical guideline:

[http://www.aaos.org/cc\\_files/aaosorg/research/guidelines/hipfxguideline.pdf](http://www.aaos.org/cc_files/aaosorg/research/guidelines/hipfxguideline.pdf)

Other citations retrieved met one or more exclusion criteria.

Scottish Intercollegiate Guidelines Network (SIGN):

1 article retrieved in PubMed search referencing the SIGN guideline therefore searched website for more up to date CPG.

1) Guidelines in left margin - by subject - orthopaedics retrieved 1 citation:

SIGN No. 111 "Management of Hip Fractures in Older People:

<http://www.sign.ac.uk/pdf/sign111.pdf>

Guidelines International Network (G-I-N) International Guideline Library:

searched key word "hip fracture" retrieved 6 citations, 4 were practice guidelines:

NICE CPG retrieved

SIGN CPG retrieved

2 non-English (German and Finnish)

#### Healthcare Safety and Quality Organization Website Searches

National Institute for Health and Care Excellence (NICE):

Link to full CPG found in PUBMED search, checked NICE website to cross check reference:

1) search using key word "hip fracture" retrieved 60 citations

2) added filter on left side margin - guidance category - clinical guidelines retrieved 6 citations, of those 1 citation: Hip Fracture: management (Clinical guideline [CG124]) retrieved:

<https://www.nice.org.uk/guidance/cg124>

3) then find link to full guideline:

<https://www.nice.org.uk/guidance/cg124/evidence/full-guideline-pdf-183081997>

May 2017 updated addendum also found.:

<https://www.nice.org.uk/guidance/cg124/evidence/full-guideline-addendum-pdf-4476372301>

Australian Government National Health and Research Council:

Upon reviewing Mak, Cameron & March (2010) article summarising the CPG authors make reference to the National Health and Medical Research Council for clinical practice guidelines in Australia, therefore searched website for complete and up to date CPG:  
<https://www.nhmrc.gov.au/>

1) top of page for clinical practice guideline portal

2) search using key word "hip fracture" retrieved 1 citation: Australian and New Zealand Guideline for Hip Fracture Care - Improving Outcomes in Hip Fracture Management of Adults:  
<https://www.clinicalguidelines.gov.au/portal/2393/australian-and-new-zealand-guideline-hip-fracture-care-improving-outcomes-hip-fracture>

3) then:

<http://anzhfr.org/wp-content/uploads/2016/07/ANZ-Guideline-for-Hip-Fracture-Care.pdf>

Mak et al. (2010) complete CPG no longer indexed on site, therefore presumed to be out of date.

#### Personal Communications and Resulting Website Searches

Bone and Joint Health Network Canada:

While searching for a Canadian CPG S. Filiatreault had personal communication (11 February 2017) with a front-line knowledge user in Alberta who sent her the "Alberta Surgical Fractured Hip Care Pathway", found website related to Pathway. Upon examination of the references included for the development of the pathway: NICE, SIGN, and Mak et al. (2010) CPGs were referenced. Other references included Waddell et al. (2011) "National Hip Fracture Toolkit" as well as the "Improving time to surgery: Emergency room, preoperative and immediate postoperative clinical practice guidelines for the management of hip fracture patients" CPG from Bone and Joint Canada. From the reference list:

1) link available to download Bone and Joint National Hip Fracture Toolkit:

<http://boneandjointcanada.com/wp-content/uploads/2014/05/National-hip-fracture-toolkit-June-2011.pdf>



Bone and Joint Canada website also searched to ensure retrieved Bone and Joint National Toolkit was the most up to date (no newer version found).

2) within document there is reference to "Improving time to surgery ... clinical practice guideline" therefore, needed contact committee member for further information and complete CPG:

Committee member contacted via email on 16 Feb 2017, she responded and sent complete clinical practice guideline via email on 17 Feb 2017.

#### Other Websites Searched

Other Canadian websites searched to ensure the most current, national CPG was retrieved:

Towards Optimizing Practice: <http://www.topalbertadoctors.org/cpgs/?sid=1>

Canadian Medical Association: <https://www.cma.ca/En/Pages/clinical-practice-guidelines.aspx>

No other clinical practice guidelines that meet inclusion criteria were retrieved.

Hartford Institute of Geriatric Nursing:

Reference to website found during National Guideline Clearinghouse search, therefore checked website for Hip Fracture CPG, none found.

Abbreviations are as follows: AAOS American Academy of Orthopaedic Surgeons, SIGN Scottish Intercollegiate Guideline Network, NICE National Institute for Health and Care Excellence.

Table S2

*Quality of the Clinical Practice Guidelines for the Management of Hip Fracture Patients for the Six Domains of the AGREE-II Instrument*

	<b>AAOS (2014)</b>	<b>NICE (2017)</b>	<b>ANZ (2014)</b>	<b>SIGN (2009)</b>	<b>BJHN-C (2010)</b>
<b>Domain 1: Scope and Purpose</b>					
1. Overall objective(s) of the guideline is (are) specifically described	6.0	6.3	6.7	6.0	6.3
2. Health question(s) covered by the guideline is (are) specifically described	5.0	6.7	5.0	6.3	3.7
3. Population (patients, public, etc.) to whom the guideline is meant to apply is specifically described	6.7	7.0	6.0	4.7	4.0
<b>Domain 2: Stakeholder Involvement</b>					
4. Guideline development group includes individuals from all relevant professional groups	4.0	6.0	5.3	6.3	3.3
5. Views and preferences of the target population (patients, public, etc.) have been sought	2.0	6.3	4.7	6.0	1.0
6. Target users of the guideline are clearly defined	6.3	3.7	5.7	6.0	3.0
<b>Domain 3: Rigour of Development</b>					
7. Systematic methods were used to search for evidence	7.0	7.0	2.7	3.0	1.0
8. Criteria for selecting the evidence are clearly described	7.0	6.3	5.0	2.7	1.0
9. Strengths and limitations of the body of evidence are clearly described	6.7	6.7	4.0	3.0	1.0
10. Methods for formulating the recommendations are clearly described	6.3	5.7	5.3	1.7	1.7
11. Health benefits, side effects, and risks have been considered	6.3	6.7	2.7	2.0	2.0
12. Explicit link between the recommendations and the supporting evidence	6.7	6.7	5.0	3.7	2.0
13. Guideline has been externally reviewed by experts prior to its publication	6.0	4.0	5.0	6.7	1.7
14. A procedure for updating the guideline is provided	6.7	5.0	4.0	4.3	1.0
<b>Domain 4: Clarity of Presentation</b>					
15. Recommendations are specific and unambiguous	6.0	6.3	6.0	5.3	4.3
16. Different options for management are clearly presented	5.0	7.0	6.0	4.7	4.3
17. Key recommendations are easily identifiable	7.0	6.0	6.3	6.3	4.7
<b>Domain 5: Applicability</b>					
18. Describes facilitators and barriers to its application	2.3	4.7	4.7	5.0	3.0
19. Provides advice and/or tools on how the recommendations can be put into practice	2.0	4.0	5.3	3.7	5.7
20. Potential resource implications of applying the recommendations have been considered	2.3	6.3	4.7	4.3	2.3
21. Presents monitoring and/or auditing criteria	1.0	4.7	4.3	4.3	4.3

<b>Domain 6: Editorial Independence</b>					
22. Views of the funding body have not influenced the content of the guideline	5.7	4.3	4.7	2.0	3.0
23. Competing interests of guideline development group members have been recorded and addressed	5.0	6.7	6.0	3.3	1.0
<b>Overall Assessment</b>					
Rate the overall quality of this guideline	5.3	6.3	4.7	3.7	2.3

The score shown is the average score of the 3 appraisers' scores for each item on a scale of 1 (strongly disagree) to 7 (strongly agree) and rounded to the first decimal point. Guideline group abbreviations are as follows: AAOS American Academy of Orthopaedic Surgeons, NICE National Institute for Health and Care Excellence, ANZ Australia and New Zealand Hip Fracture Registry, SIGN Scottish Intercollegiate Guideline Network, BJHN-C Bone and Joint Health Network Canada.