Development of a Self-Directed Learning Manual for Nurses Caring for Peripheral Nerve Blocks

by © Natasha Martin

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Abstract

Background: Pain is an experience that is unique to each individual and postoperative pain has been traditionally difficult to manage. Peripheral nerve blocks are an excellent form of pain control, especially for orthopaedic patients receiving total hip or total knee arthroplasty. As such, at St. Clare's Mercy Hospital, St. John's NL, they will be more frequently utilized. Completing an unfamiliar task, such as care of peripheral nerve blocks, can be taxing for new graduate nurses or nurses who are new to the skill.

Purpose: The purpose of this practicum project was to develop a self-directed learning manual for nurses caring for peripheral nerve blocks. The manual is expected to enhance the knowledge, increase the confidence, and develop the skillset in managing peripheral nerve blocks for nurses who use it.

Methods: An integrated literature review, consultations with key informants, and an environmental scan of other acute pain services in Canada were completed.

Results: Self-directed learning is an appropriate form of study for adult learners, such as nurses. Both Benner's Novice to Expert Model and Knowles' Adult Learning Theory were used as the theoretical basis for this learning manual. The content of the manual was based on information obtained from completing the methods.

Conclusion: Prior to use, key stakeholders will review the appropriateness of the content. This self-directed learning manual is expected to increase nurses' knowledge and

confidence, as well as develop their skillset in caring for patients with peripheral nerve blocks as a form of pain management after surgery.

Key words: peripheral nerve block, continuous peripheral nerve block, pain, self-directed learning manual.

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Completing an unfamiliar skill can be a challenging task for any registered nurse. New graduates nurses already have many obstacles to overcome at the beginning of their nursing careers; recognizing deteriorating patient conditions, prioritizing care, effective and concise communication, and anticipating physician orders are among some of the challenges they face. Graduate nurses have little clinical experience to draw from and therefore they rely upon nursing mentors and experienced nurses when faced with an unfamiliar situation (Fero, Witsberger, Wesmiller, Zullo, & Hoffman, 2009). Likewise, nurses undergoing job change or new required skills in their current job also have specific learning needs (Butt, Baumann, Deber, Blythe, DiCertso, 2002). A supportive environment and accessible resources are essential in the successful transition to an efficient member of the health care team (Chernomas, Dean Care, Lapointe McKenzie, Guse, & Currie, 2010). Continuous peripheral nerve blocks (CPNBs) are a form of pain management that are increasingly utilized in Eastern Health for specific surgical procedures. It is important that the registered nurse is knowledgeable about this form of pain control. The more confident nurses are regarding CPNBs and the care associated with them, the better prepared they are to care for patients receiving this therapy.

In this report, I will outline the background and importance of this practicum project. A general overview will be provided along with a review of the methods utilized in the data collection phase. I will present a summary of the data obtained from the literature review, the consultations, and the environmental scan. A summary of the self-directed learning manual will also be included along with an explanation of the advanced practice nursing competencies that were demonstrated throughout the development of this

project. A plan for implementation and evaluation will be acknowledged, and implications for this self-directed learning manual will be discussed.

Background and Importance

Pain is a subjective experience that is unique to each individual and can only be defined by the patient themselves (Sloman, Rosen, Rom, & Shir, 2005). A common theme identified throughout the literature is that a patient's pain following surgery has been difficult to treat (Bozimowski, 2012; Sawyer, Haslam, Robinson, Daines, & Stilos, 2008). Approximately 10-50% of postoperative patients experience persistent pain long after the acute postoperative period has ended (Canadian Pain Society, 2014). Poorly controlled pain in the acute postoperative period has been associated with the development of chronic pain (Kehlet, Jensen, & Woolf, 2006) thereby making effective pain management in the postoperative period a key element in ensuring optimal patient outcomes (Sloman et al., 2005). Effective pain management aids in ambulation and deep breathing and coughing, which in turn impedes atelectasis and deep vein thrombosis while promoting wound healing (Duzel, Aytac & Oztunc, 2013; Sloman et al., 2005). As a result, managing pain at a tolerable level for the patient during the acute phase will enhance recovery and subsequently have lasting effects for patient well-being.

As the Clinical Nurse Specialist (CNS) of the Acute Pain Service (APS) at St. Clare's Mercy Hospital (SCMH), I observed that nurses had insufficient knowledge of caring for patients with nerve blocks. The nurses assigned to these patients indicated that they experienced a level of uncertainty regarding the assessment and care. To have a

manual that is readily available would strengthen knowledge and skills and increase the confidence and competence of nurses caring for CPNBs. With enhanced knowledge and an integrated skill set, nurses will be more prepared to care for patients receiving this therapy, leading to optimal pain outcomes.

Practicum Project

A self-directed learning manual on the care of CPNBs was chosen for this practicum project. I had determined through findings from my review of the literature that this type of resource would to be the best option to meet the learning needs of nurses caring for patients receiving this treatment. Self-directed learning is advantageous to nurses as it allows them to focus on their own learning needs (Rankin & Mitchell, 2000; Starling, 2001). Nurses will benefit most from information that is readily accessible to comply with the time constraints and demand of their working environment (Davis, 2015). It will be available to those wanting to refresh knowledge and those new to the skill, new to the unit, or new to the profession. Nurses can read it as time permits, as well as use it for quick reference. A self-directed learning manual will allow nurses to evaluate their own knowledge about the subject and to determine their learning needs (Davis, 2015). This manual will provide nurses with enhanced knowledge and meaningful justification that will complement the procedures provided in the Eastern Health policy on CPNBs.

Support Contacts

In the development of this self-directed learning manual two individuals where chosen as contact people that would act as resources and supports throughout the practicum project. These contacts were Ron Corcoran, the division manager for Vascular Surgery (5 East) and Tara Rose, the division manager for Orthopaedic Surgery (6 West) at SCMH. Both contacts were informed of the purpose and rationale of the project, as well as were aware of progress throughout the completion of the manual.

Goals and Objectives

There are several goals and objectives that I expected to have met by completion of this practicum project. The main goal that I expected to accomplish was:

1) Develop a learning resource manual for nurses who care for patients with CPNBs.

The goals that I aspired for nurses by completion of this project were as follows:

1) Enhance the knowledge and develop the skillset of nurses caring for patients with CPNBs.
2) Enhance the confidence of nurses caring for patients with CPNBs (secondary to achieving goal #1 for nursing).

The specific practicum objectives were as follows:

1) Conduct a literature review.

2) Apply advanced nursing competencies (clinical, research, leadership, consultation and collaboration competencies) in planning and developing the self-directed learning manual.
3) Consult with key stakeholders (an experienced surgical nurse, a newly graduated nurse, the clinical nurse educator for the surgery program, and an anesthesiology physician).
4) Conduct environmental scan.
5) Develop self-directed learning manual.

Overview of Methods

Three key methods were used in the collection of data necessary to execute this project. Two of these three methods served to provide important information and insight on the learning needs of the nursing population. These were the integrated literature review and the consultations with key informants. The third, an environmental scan of other health facilities in Canada served to determine if other areas have a resource similar to the one proposed for this project, which may offer insight into content to be included, as well as effectiveness of such a learning resource.

Themes were identified from the integrated literature review. These included pain and the patient experience of pain, nursing knowledge and attitudes on pain and pain management, the use and benefit of pain rating scales, CPNBs for pain management, and the experience of new nurses and nurses new to the skill of CPNBs. Learning theories were also examined. Two theories were chosen as the foundation of the manual; Benner's

Novice to Expert Model and Knowles' Adult Learning Theory. Consultations were completed with key informants and interviews took place with five post-surgical registered nurses, the clinical educator for the surgery program, and an anaesthesiologist. An environmental scan was completed with other health facilities in Canada to determine if they had a resource similar to the one proposed in this project.

A summary of results from each of these methods is found in the Appendices. The comprehensive "Integrated Literature Review" can be found in Appendix A. The "Consultation and Environmental Scan Report" can be found in Appendix B.

Summary of the Literature Review

Search Methods

The information included in the integrated literature review was attained using two databases, CINAHL and PubMed. These were chosen based on their comprehensiveness for nursing and medical literature. Search terms included nerve blocks, continuous peripheral nerve blocks, nursing care, and arthroplasty. Other terms searched were experience, learning needs, and critical thinking ability of new and experienced nurses.

All articles were reviewed for their relevancy in support of this project. Appropriate articles were then evaluated and appraised using tools specific to quantitative or qualitative literature. Quantitative studies were evaluated using the Public Health Agency of Canada (PHAC) Critical Appraisal Tool Kit (PHAC, 2014). Qualitative

studies were appraised based on scientific merit, clarity of the research, methodology, rigour, and ethical considerations (Critical Appraisal Skills Programme (CASP) Qualitative Checklist, 2013). Content from suitable articles were then examined for themes. The themes that emerged were pain and the patient experience, nursing knowledge and attitudes on pain and pain management, pain rating scales, CPNBs for pain management, and the experience of new nurses and nurses new to the skill of CPNBs.

Pain and the patient experience

A patient's surgical pain is recognized as an experience that is very difficult to describe due to its subjectivity. It has been widely accepted that a patient's pain can only be defined by the patient themselves (Francis & Fitzpatrick, 2013) and is the most accurate form of pain measurement (Seisser & Ward, 2002).

There are many factors that affect patients' pain experience and their level of involvement in the plan for pain management following surgery. Some patients feared that reporting pain would label them as demanding (Eriksson, Wikstrom, Fridlund, Arestedt, & Brostrom, 2016; van Dijk, Vervoort, van Wijck, Kalkman, & Schuurmans, 2016). Some had difficulty in describing pain using the accepted pain rating scales (Eriksson et al., 2016; van Dijk et al., 2016). Patients also avoided asking for pain medications when nurses appeared busy (Carr & Thomas, 1997; Eriksson et al., 2016; MacLellan, 2004). However, those concerns diminished when the nurse was responsive and expressed reassurance regarding their pain (Eriksson et al., 2016). The fear of

possible negative side effects, such as drowsiness and nausea (van Dijk et al., 2016) as well as the fear of addiction were also factors in avoiding pain medication (Carr & Thomas, 1997; MacLellan, 2004). Patients who received education on pain expectations and pain management were found to be more active participants in their own pain management plan (Carr & Thomas, 1997; Eriksson et al., 2016; MacLellan, 2004).

Nursing knowledge and attitudes on pain and pain management

Effective pain control in the postoperative patient is highly beneficial, however there is a continued documented struggle in providing adequate pain management to this population (Canadian Pain Society, 2014; Sawyer et al., 2008). Nurses play an essential role in managing postoperative pain to promote enhanced recovery of their patients. Nursing beliefs and perceptions surrounding pain and pain management have been identified as a barrier in pain control (Kohr & Sawhney, 2005; Sawyer et al., 2008). Following formal nursing education, there is little additional education provided regarding pain. A major influence on the assessment of pain and pain management by health care providers subsequently arises from colleagues and organizational culture (Kohr & Sawhney, 2005; Sawyer et al., 2008; Carr et al., 2014).

There were many collective beliefs and perceptions by health care providers regarding pain and pain management. There is the perception is that patients exaggerate their level of pain (Abdalrahim, Majali, Warren Stromberg, & Bergbom, 2011; Bowimowski, 2012; Rawe et al., 2009) and that pain is accompanied by changes in vital signs and behavioural indicators (Seisser & Ward, 2002). These indicators may be

present in some patients; however, they may be brief and not consistent as a true indication of persistent pain (Seisser & Ward, 2002). Patient's ability to cope with pain can create difficultly in clinician assessment; some patients are able to joke and sleep while experiencing pain. This behaviour can result in health care providers underestimating a patient's pain intensity (Drayer, Henderson, & Reidenberg, 1999; Seisser & Ward, 2002; Wentz & Warnock, 2006). Different interpretations of a patient's pain based on assessments from different clinicians may also act as a barrier to optimal pain management (Bowimowski, 2012).

Another common misconception is that patients will develop an addiction to pain medication if frequently used in the postoperative period (Abdalrahim et al., 2011; Bowimowski, 2012; Kohr & Sawhney, 2005). The fear of producing opioid addiction in patients can lead to the under treatment of pain in the postoperative population (Wentz & Warnock, 2006). There is also a concern of overmedicating the opioid-dependant patient. A lack of understanding of chronic pain and its management can have a detrimental effect on the treatment of acute surgical pain. It is essential that patients continue to receive treatment for chronic pain to prevent the exacerbation of acute surgical pain (Wentz & Warnock, 2006).

An additional barrier to appropriate pain control is the lack of an accurate assessment, follow-up, and subsequent plan for management. Time constraints were recognized as a factor inhibiting a thorough assessment (Samuals & Fetzer, 2009). Inadequate assessment paired with insufficient documentation leaves the health care team

with a picture of pain that is difficult to interpret (Carr et al., 2014; Francis & Fitzpatrick, 2013).

Pain rating scales

Pain assessment tools are valuable for interpreting the patient's pain quality and intensity such that appropriate intervention can be employed (Wentz & Warnock, 2006). Although the value of pain assessment tools is recognized (Layman Young, Horton, & Davidhizar, 2006), they are not frequently used in the evaluation of pain in the care area (Dihle, Bjolseth, & Helseth, 2006; Idvall & Berg, 2008).

Two pain rating scales are recommended for use in Eastern Health; the PQRST Pain Assessment Method and the Numerical Rating Scale (NRS) (Sheppard, Goulding, Fulford, Earle, & Quinlan, 2012). The PQRST Pain Assessment Method is the initial method that is recommended to assess the patient's pain. It is a detailed evaluation that is meant to help the nurse in appraising the intensity of pain. PQRST stands for provocation/palliation, quality/quantity, region/radiation, severity scale, and timing (Kirwan, 2010). The NRS is recommended as a follow-up and for rating all subsequent assessments of pain. This numerical scale is labeled from zero (no pain) to ten (worst possible pain) where patients are asked to rate their pain intensity (Sheppard et al., 2012).

Continuous peripheral nerve blocks for pain management

Continuous peripheral nerve blocks are recognized as an excellent form of limb specific pain control for many different types of surgical procedures (Polomano,

Rathmell, Krenzischek, & Dunwoody, 2008). It has been associated with fewer negative side effects than those associated with traditional opioids (nausea, vomiting, pruritus, respiratory depression, ileus, and drowsiness) (Capdevila, Ponrouch, & Choquet, 2008; McCamant, 2006). Surgical orthopaedic patients that had received peripheral nerve blocks experienced better pain control and met orthopaedic goals earlier compared to patients treated with traditional opioids (Anderson, Donnelly, Groose, Chambers, & Schroeder, 2014; Hebl et al., 2008). Earlier ambulation of this patient population has been associated with decreased postoperative complications (deep vein thrombosis, pulmonary embolism, muscle atrophy) (Anderson et al., 2014), enhanced recovery, and earlier discharge from hospital (Anderson et al, 2014; Guarin, 2013; Hebl et al., 2008; McGraw & Ilfeld, 2012).

It is important for nurses to have a comprehensive understanding of the anatomy and physiology of peripheral nerves, peripheral nerve blocks, potential side effects, and nursing assessment and care associated with this form of pain control (McCamant, 2006). A patient with a peripheral nerve block will have decreased sensation in the area that is innervated by the nerve plexus impacted and motor function can also be affected. Thus, it is imperative that the nurse has knowledge of the type of blocks and the areas that are involved such that the limb can be properly supported and protected (McCamant, 2006). Nurses must be proficient in their assessments so that negative side effects associated with peripheral nerve blocks can be promptly recognized and treated. Side effects may include infection, intravascular migration, hematoma, pneumothorax, nerve injury,

damage to the blocked area, and local anaesthetic toxicity (Capdevila et al., 2008; McCamant, 2006; McGraw & Ilfeld, 2012).

Experience of new nurses and nurses new to the skill of CPNBs

The experience of nursing students transitioning to graduate nurses has been well documented as a demanding time (Chernomas et al., 2010; Edwards, Hawker, Carrier, & Rees, 2015; Ketelaar, Nieuwenhuijsen, Frings-Dresen, & Sluiter, 2015; Laschinger et al., 2016). New graduates enter the workforce armed with a strong formal education but are often inexperienced. They require time for orientation and support from colleagues to build a strong knowledge base and skill set. With staff shortages, it may be expected that new graduates conclude orientation with expectations to function with the same ability as experienced nurses (Chernomas et al., 2010).

Many new graduate nurses' struggle with interprofessional communication. They often have limited experience with consulting appropriate services (Pfaff, Baxter, Jack, & Ploeg, 2014b) and lack confidence when communicating with physicians (Pfaff, Baxter, Jack, & Ploeg, 2014a; Pfaff et al., 2014b). New graduates often find themselves struggling with delegation of work (Pfaff et al., 2014a). Additionally, newly graduated nurses have limited experience in critical thinking. Support and guidance from colleagues is required, along with an array of clinical situations to encourage the development of their own clinical judgement (Fero et al., 2009; Laschinger et al., 2016).

Experienced nurses who are undergoing job or role change will have learning needs related to new skills that they may have not previously encountered (Butt et al., 2002). Although they may have knowledge and clinical experience that could be transferrable, it is important they feel supported by management and colleagues, and their learning needs be recognized and addressed (Butt et al., 2002).

Self-directed learning

Self-directed learning is a method of study with many benefits for adult learners; it is convenient, accessible, and cost effective (Starling, 2001; Turner et al., 2009). This type of learning allows nurses to learn at their own pace or to choose areas of the study package that is beneficial to them (Rankin & Mitchell, 2000; Starling, 2001). It is especially useful for learners in dynamic work environments as its availability overcomes the barrier of time constraints that is often problematic on nursing units (Rankin & Mitchell, 2000; Starling, 2001). For these reasons, I determined that this type of learning resource would be most useful for my target audience.

Theoretical basis

Benner's novice to expert model.

Patricia Benner's Novice to Expert Model was used as a theoretical framework in the development of the self-directed learning manual for this project. Five levels of nurse competence are depicted: novice, advanced beginner, competent, proficient, and expert (Benner, 1982; Fero et al., 2009). The self-directed learning manual was designed such

that any nurse on the continuum from novice nurse to expert could utilize the learning manual by studying the sections that are relevant to their learning needs.

Knowles' adult learning theory.

Knowles' Adult Learning Theory was also used as a theoretical framework in the development of this manual. This theory articulates that the learner is invested in the learning process (Mitchell & Courtney, 2005). The theory is built on six key principles of adult learning: adults need to know why they are learning, adults have to take responsibility for their own learning, the learners previous experiences should be built upon, the information should be relevant to their situation, adults are motivated to learn, and information is to be problem-centered using real examples (Mitchell & Courtney, 2005).

The structure of the manual was based on the principles of Knowles' Adult Learning Theory. An introduction was provided, giving a clear explanation of the purpose of the manual. A table of contents was supplied, allowing nurses to choose to read the entire manual or to choose the sections they wish to read based on their current learning needs. This concept embraces the principle of building on and respecting the learner's previous experiences. A "test your knowledge" section was added so that nurses could avail of problem-based questions to evaluate their own knowledge after completing the manual.

Summary of Consultations & Environmental Scan

Consultations

The data from the consultations were collected in person, using a semi-structured interview style. This permitted the elaboration of answers as required. The information gleaned from the consultations was organized into themes; barriers to effective pain management, pain assessment, and education needs for nurses.

Barriers to effective pain management.

Many barriers to effective pain management in the acute postoperative period were identified. Informants thought that a patient's previous experience with pain was a key element in their expectations of pain postoperatively. Lack of patient education or comprehension in pain management was acknowledged as well, possibly affecting the patient's report of pain and leading to difficultly with ambulation and recovery. Informants' noted that pain was not well controlled in the postoperative period and identified that pain and pain medication use was affected by body mass index and age. It was also articulated that side effects such as urinary retention created anxiety in patients, further exacerbating the presence of acute pain. The presence of chronic pain was also thought to play a part in the management of pain. A lack of a thorough nursing assessment regarding the presence of chronic pain was recognized a contribution to poor pain management. The patient's chronic pain management regime was not always effectively incorporated into acute pain management plan.

Pain assessment.

Most informants considered pain scales helpful in the assessment and quantification of pain. Pain scales were useful tools in providing quantifiable support that the pain management regime needs to be adjusted. Informants acknowledged that the patient's pain will be based on the patient's previous experience of pain and will therefore be subjective. Yet, it was also recognized that a patient's report of pain was the most accurate assessment. The importance of using appropriate scales for patients' with dementia (Pain Assessment in Advanced Dementia Scale), who are non-verbal (Checklist of Nonverbal Pain Indicators) or suffering from addiction, was noted.

Education needs for nurses.

With further education in the skill of CPNBs, informants thought they would quickly adjust to caring for patients receiving this type of therapy. SCMH is a small teaching hospital with a community feel and supportive colleagues, adding to their confidence in learning a new skill. Informants noted that new graduates might feel less confident in completing a new skill as compared to a more experienced nurse. They also acknowledged the importance of exhibiting confidence when performing skills in sustaining the nurse-patient therapeutic relationship.

A lack of educational resources available for the orthopaedic unit was identified. When asked where informants would look for information of CPNBs answers included

policy, the Eastern Health intranet, the clinical educator, the nurse in charge, the unit assigned clinical expert, a colleague, the acute pain service, and research articles.

Suggestions were provided for information for the self-directed learning manual and included: indications for use of a nerve block, benefits of using a nerve block, medication information, nursing assessment and management, common side effects and complications, and guidance on what to do/who to contact if complications were experienced.

Environmental Scan

An environmental scan was undertaken to learn if self-directed manuals for CPNBs were available and utilized by other acute pain services in Canada. Acute pain services in Capital Health, Nova Scotia and Horizon Health, New Brunswick were contacted by telephone. Acute pain services in Peterborough Regional Health Centre, Ontario and the University of Alberta Hospital, Alberta were reached via the Canadian Pain Society pain special interest group. All respondents indicated that they had manuals that were used by nurses, however no formal evaluation for effectiveness had been completed.

Summary of the Self-Directed Learning Manual

The self-directed learning manual was constructed utilizing the results of the integrated literature review and the consultations with key informants. The manual was theoretically based on Benner's Novice to Expert Model and Knowles' Adult Learning

Theory. The manual content contained several sections including: pain, anatomy of the peripheral nervous system, indications for CPNBs, types of CPNBs, medication information, benefits of CPNBs, potential complications of CPNBs, nursing assessment and management, patient education, APS role, and a self-assessment test.

A table of contents was used to divide the manual into sections. This format allows nurses to read the entire manual or to choose the sections they wish to focus on. Sections 1 and 2 focused on pain and anatomy of the peripheral nervous system. This allows nurses to review and build upon previous knowledge. Subsequent sections provide information on indications for CPNBs, the types of CPNBs, common medications used, the benefits and complications, nursing assessment and management of the patient receiving a CPNB, recommended patient education, and the role of the APS. A self-assessment test with an answer key at the end of the manual allows nurses to test their knowledge.

Advanced Practice Nursing Competencies

Advanced nursing practice competencies are "the specific knowledge, skill, judgment and personal attributes required for a registered nurse to practice safely and ethically in a designated role or setting" (Canadian Nurses Association (CNA), 2008). The competencies are divided into four classifications: clinical, research, leadership, and consultation and collaboration. Each of these competencies have been demonstrated in this practicum project.

Clinical Competencies

Clinical competencies are demonstrated by having expertise in a specialized area of nursing care. It involves combining clinical experience and knowledge with theory and research (CNA, 2008). This clinical expertise of the advanced practice nurse (APN) is related to the direct and indirect care that they provide to patients and their families to promote health (Tracy, 2009). The APN demonstrates direct care by managing treatment using advanced critical thinking, a holistic care approach, and assuming accountability through evidence based practice (Tracy, 2009). Indirect care is exemplified through consultation, discharge planning, coordination of care, and practicing using evidence as a guideline (Tracy, 2009). This competency was achieved by using clinical experience and knowledge extracted from my previous role as a surgical nurse and from my current role as the CNS of the APS at SCMH. Using evidence-based information and through consultations with colleagues, essential information for a self-directed learning manual was identified and incorporated. Having expertise in this specialized area of care though my previous experience as a surgical nurse and my current role as CNS of the APS, I was able to determine information that would be most helpful to nurses.

Research Competencies

Research competencies involve conducting research, in addition to incorporating evidence-based research into practice (CNA, 2008). The ability to conduct and to utilize research is an essential proficiency of the APN. The APN's ability to lead by example when carrying out research, as well as incorporating current research into practice, is

imperative to their role as a leader (DePalma, 2009). Nurses can conduct research by investigating a topic, collecting information, and evaluating the response. Nurses can also be consumers of research by critiquing the literature and applying evidence based research into practice (CNA, 2008). Research competencies were demonstrated throughout the course of the project by using a systematic process in the development of the manual. Throughout this project, I was a consumer of research. During the beginning phases of this project, an integrated review of the literature was completed. Appropriate theories were examined and applied in the manual to meet the educational needs of the nurses who would be using it. It was essential that content was current, applicable to the manual, and aligned with the learning needs of nursing.

Leadership Competencies

According to the CNA (2008), APN's are leaders in their workplace; they drive policy and contribute to enhancing patient care. Similarly, Spross & Hanson (2009) state that the leadership characteristics include: "mentoring and empowerment, innovation and change agency, and activism" (p. 249). The administration of peripheral nerve blocks is increasing at SCMH for specific patient populations. Leadership competencies were demonstrated through the development of a learning manual that will be utilized by nurses who will be caring for these patients. Through developing this self-learning manual, I hoped to advance nursing practice in the delivery of care to this patient population. In completing this process, it was anticipated that other nurses would feel empowered to also bring research into practice to provide optimal care.

Consultation and Collaboration Competencies

The APN is able to effectively communicate with patients, as well as consult and collaborate with other health care professionals (CNA, 2008). Through each stage of this project, it was essential to exhibit good communication skills. This competency was demonstrated through consultations with key informants to obtain pertinent information and resources necessary to include in the learning manual. Collaborative relationships with these key informants were developed and the continued alliance was essential in the success of the project. Continued and frequent collaboration and communication with my Supervisor, Professor Renee Crossman, was vital in the development of a quality and informative learning manual.

Implementation and Evaluation

Upon completion of this practicum project, the finalized self-directed learning manual will be presented to key stakeholders; both support contacts, the APS nurse at the Health Sciences Centre (HSC), St. John's, NL, the anaesthesia APS at SCMH and the HSC, and the clinical educators for the surgery program at both sites. After their approval is obtained, the manual will be made available to nurses on the surgical units by the clinical educators.

Evaluation will be completed using two platforms. After completing the manual, nurses may evaluate their own knowledge by using the self-test available at the end of the manual. The manual will also be formally evaluated for effectiveness in increasing

nurses' knowledge, confidence, and skill changes in caring for patients with CPNBs using an impact survey administered at one and six months after implementation (McKenzie, Neiger, & Thackeray, 2013).

Conclusion

In this report the background, importance, and goals of this practicum project have been discussed. An overview of the methods used to complete this project was presented, along with summaries of the literature review, the consultations, and environmental scan. The concept of self-directed learning was explained and the theoretical basis for the project was presented. A summary of the self-directed learning manual was provided and examples of how advanced nursing competencies were demonstrated throughout the project were included. Finally, a plan for implementation and evaluation of the self-directed learning manual was presented.

The development of a self-directed learning manual in this practicum project has implications for nursing knowledge, confidence, and skills while caring for patients with peripheral nerve blocks. It also has implications for patient outcomes. It is expected that nurses caring for CPNBs will be more knowledgeable and confident in their management of this treatment option. It is also expected that patients receiving this type of pain management will have effective pain control, participate in early ambulation, experience fewer side effects traditionally associated with opioids, and experience enhanced recovery after surgery.

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Appendix A

Integrated Literature Review

Natasha Martin (200215424)

Memorial University of Newfoundland

Abstract

Pain is frequently experienced by postoperative patients. It may be an area of distress for those who are experiencing acute pain after surgery. This may be especially so for patients who suffer from chronic pain and are anticipating acute pain from an upcoming surgery. Continuous peripheral nerve blocks (CPNBs) are a form of pain management that is used in Eastern Health. Registered nurses are responsible for the assessment and care of patients receiving CPNBs. This skillset can be intimidating for new nurses, nurses new to the skill, and nurses new to a unit where CPNBs are utilized. The purpose of this paper is to provide support for the development of a self-learning manual for nurses caring for CPNBs. In doing so, I will complete an integrated literature review that examines the experience of pain, nursing knowledge and attitudes regarding pain, the learning needs of nurses caring for patients with CPNBs, the benefits and risks of CPNBs, and the value of self-directed learning manuals. Knowles' Adult Learning Theory and Benner's Novice to Expert Model will be presented as a theoretical background for this project.

Key words: pain, continuous peripheral nerve block, self-directed learning manual, nurse.

Despite advances in technology and knowledge to treat and manage pain in Canada, many of our patients remain in pain after surgical procedures (Canadian Pain Society, 2014). Fifty percent of patients report experiencing moderate to severe pain after surgery and 10-50% of surgical patients continue to experience debilitating pain long after the acute period has passed (Canadian Pain Society, 2014).

Patients having major orthopaedic surgery such as total knee arthroplasty (TKA) and total hip arthroplasty (THA) often face a significant amount of pain (Hebl et al., 2008). Continuous peripheral nerve blocks (CPNBs) are a form of pain management that has been identified as an effective modality of pain management for this patient population (Hebl et al., 2008). Registered nurses need a thorough understanding of the peripheral nerve pathways, how CPNBs work and the associated risks and the benefits to provide safe and competent care (McCamant, 2006). In this paper, I will present an integrated literature review to examine the importance of a CPNB self-learning manual to nurses. In doing so, I will present information the experience of pain, the care associated with CPNBs, the learning needs of nurses caring for CPNBs, and the effectiveness of self-directed learning. Knowles' Adult Learning Theory and Benner's Novice to Expert Model will be explored to provide a theoretical foundation for this learning resource.

Integrated Literature Review

Topic background and importance

Pain has been considered by some to be the fifth vital sign (Carr et al., 2014; Weetman, 2009). According to the Canadian Pain Society (2014), pain is startlingly

undertreated in post-surgical patients, with a significant percentage of patients reporting moderate to severe pain in the acute phase. This may be due to the fact that pain is a highly subjective experience that is appraised differently by individual patients, thus making an accurate nursing assessment difficult (Weetman, 2009). Treating postoperative pain is essential to promote optimal patient outcomes. A patient with well controlled pain is more likely to ambulate early, practice deep breathing, and perform physiotherapy assigned exercises. This in turn, stimulates multi-system regulation aiding in the patients recovery (Duzel, Aytac, & Oztunc, 2013; Sloman, Rosen, Rom, & Shir, 2005; Weetman, 2009), and thereby decreases complications such as anxiety, sleep disturbance, hypertension, tachycardia, nausea and vomiting, atelectasis, and deep vein thrombosis (McLean, Martin, Cousley, & Hoy, 2013).

Continuous peripheral nerve blocks have been recognized as an acceptable form of pain management as they provide excellent analgesia with fewer side effects than most traditional medicinal options (Hebl et al., 2008). They have been acknowledged as an effective form of pain control for major orthopaedic surgeries such as TKA and THA (Hebl et al., 2008; McGraw & Ilfeld, 2012; Turjanica, 2007). Additionally, the use of CPNBs has been shown to promote patient recovery and decrease the length of stay of the surgical population (Finn et al., 2016).

The proposed project of a self-learning manual on the care of CPNBs would help provide a more successful pain management regime and ensure optimal patient outcomes by increasing nursing knowledge and confidence when caring for CPNBs. As the Clinical

Nurse Specialist (CNS) in the Acute Pain Program at St. Clare's Mercy Hospital in St. John's, NL, the uncertainty in providing care for patients with CPNBs was apparent in nursing practice. Nurses were unsure if the assessment they were completing constituted a full assessment of what is required of a patient receiving a CPNB. They were also unsure of the rationale behind parts of the assessment, such as assessing for signs of local anaesthetic toxicity. It is imperative that registered nurses have a thorough understanding of CPNBs, nerve physiology, and the associated nursing assessment and care.

Search methods

In this literature review two databases were searched for information, CINAHL and PubMed. CINAHL was used because it is the largest and most comprehensive nursing database (CINAHL Support Center, 2016). The PubMed database was used as it includes literature from MEDLINE life sciences journals, and online books (PubMed, 2016). The terms "continuous peripheral nerve block" and "nerve block" were searched. The terms "nurs*" and "nursing care" were used. Very few articles were obtained using these search terms. Searching continuous peripheral nerve blocks and arthroplasty achieved more results. Using the search term continuous peripheral nerve block alone uncovered hundreds of results. The experiences, learning needs, and critical thinking ability of new and experienced nurses were also searched. The use of self-directed learning manuals was also a focus in the search for literature.

Articles that fit the search criteria listed above were reviewed and evaluated for their contribution to the integrated review. Articles were separated based on

determination of either qualitative or quantitative analysis and appraised accordingly. Qualitative studies were evaluated based on scientific merit, clarity of the research, methodology, rigour, and ethical considerations (Critical Appraisal Skills Programme (CASP), 2013). Quantitative studies were evaluated using the Public Health Agency of Canada (PHAC) Critical Appraisal Tool (PHAC, 2014). Literature summary tables demonstrate key sources of support for this project and can be found in Appendix A1.

Pain and the patient experience

The management of postoperative pain has been problematic for decades due to the subjectivity of the pain experience, nursing knowledge and attitudes regarding pain, and the reliability of pain management scales. This deficiency in patient care has been recognized and efforts have been made over the years to improve policy and to implement new techniques (Carr et al., 2014; Rawe et al., 2009). Although practices have improved over time, patients continue to experience moderate to severe pain after surgical procedures (Canadian Pain Society, 2014; MacLellan, 2004).

Pain is a phenomenon that has been difficult to define. It has been accepted by the majority of the health care community that a patient's pain is a very individual experience that can only be described by the patient themselves (Francis & Fitzpatrick, 2013). Margo McCaffery, who has been instrumental in the study of pain and nursing pain management, defines pain as "…whatever the experiencing person say it is, existing whenever he says it does" (Seisser & Ward, 2002, p. 19). This does not necessarily mean that the patients report must be taken literally by the health care provider, but that the

patients reported pain must be assessed and action taken. No other source of information is considered as reliable or as accurate as the patients self-report of pain. Patient vital signs, patient behaviour, and health care provider opinion of the intensity of a patient's pain are not reliable forms of pain measurement and should not be used (Seisser & Ward, 2002).

Due to differences in individual tolerance levels, the experience of pain is quite different for each person. Patients may have many apprehensions that prevent them from becoming actively involved in their own pain management regime postoperatively. Patients conveyed that reporting pain may label them as demanding (Eriksson et al., 2016; van Dijk et al., 2016). When nurses responded with kindness and responsiveness in treating their pain, patients reported that those fears were lessened (Eriksson et al., 2016). Others refrained from taking analgesics as they feared possible negative side effects (nausea, drowsiness) or experienced those side effects (van Dijk et al, 2016). Some patients expressed fear for the possibility of addiction to the type of analgesia used (Carr & Thomas, 1999; MacLellan, 2004). Other refrained from asking for pain medications when they reported nurses looked busy and felt less burdened when they were asked if they required analgesia for pain. They felt unsure in their role in pain management and would rather rely on the nurse to offer analgesia (Eriksson et al., 2016; MacLellan, 2004). Similarly, Carr & Thomas (1997) identified the main barriers of appropriate pain control to be lack of a thorough assessment, and an unwillingness of patients to ask for pain medication when nurses appeared busy.

Patients sometimes find it difficult to express their pain on the accepted numeric ratings scales. They may feel like the magnitude of their pain is not captured. Rather, some find it much easier to describe pain (Eriksson, Wikstrom, Fridlund, Arestedt, & Brostrom, 2016; van Dijk, Vervoort, van Wijck, Kalkman, & Schuurmans, 2016). Patients that were provided education regarding expectations of pain after surgery and options to manage pain, generally felt less anxiety and were more willing to ask for analgesics when required (Carr & Thomas, 1997; Eriksson et al., 2016; MacLellan, 2004). Other patients who were given no education regarding pain management were left feeling like there was no clear plan for controlling their pain (Carr & Thomas, 1997; Eriksson et al., 2016; Kohr & Sawhney, 2005; MacLellan, 2004; Waterman, Leatherbarrow, Slater, & Waterman, 1999).

Researchers have attempted to capture the experience of patient's pain postoperatively. In an exploratory study, Carr et al. (2014) found that 27.2% to 65.5% of post-surgical patients had experienced significant pain during their admission to hospital. The recurrence of pain was also found to be high after the pain had been treated. Although it is expected that patients will experience some level of pain after a surgically invasive procedure, it is presumed that thorough assessment and management should prevent significant pain from occurring (Abdalrahim, Majali, Warren Stromberg, & Bergbom, 2011; Carr et al., 2014). Similarly, Rockett, Simpson, Crossley, & Blowey (2013) found that 16.7% of surgical patients experienced significant pain in the acute period. This suggests the need for improved and frequent assessment, along with

enhanced management of pain (Carr et al., 2014). A detailed assessment will provide the clinician with a foundation on which to base intervention (Carr & Thomas, 1997).

Nursing knowledge and attitudes on pain and pain management

The nursing discipline plays a large role in the postoperative care of patients, executing the plan of care constructed for each individual patient (MacLellan, 2004). A part of the care plan for postoperative patients includes the management of pain in support of an uncomplicated recovery. The importance of pain management for optimal recovery in the postoperative patient has been widely recognized. Researchers have outlined countless interventions that have been implemented in an attempt to successfully improve assessment and management of postoperative pain. However, despite numerous attempts, healthcare continues to fall short in providing effective pain management to this patient population (Sawyer, Hanslam, Robinson, Daines, & Stilos, 2008).

Nursing beliefs and perceptions have been identified as barriers that affect pain management (Kohr & Sawhney, 2005; Sawyer et al, 2008). Nurses receive education on pain and pain management during their formal education, however few receive any additional comprehensive education about pain. Much of their understanding of pain past this point is largely influenced by their colleagues and work environment. This is thought to account for the deficiency in knowledge, development of beliefs systems (Kohr & Sawhney, 2005; Sawyer et al., 2008), and organizational culture (Carr et al., 2014) which contribute to poor pain management.

Beliefs and perceptions regarding patients' pain can be affected by the culture of the nursing unit. These perceptions include the idea that patients exaggerate their level of pain (Abdalrahim et al., 2010; Bozimowski, 2012; Rawe, 2009), misconceptions regarding addiction (Abdalrahim et al., 2010; Bozimowski, 2012; Kohr & Sawhney, 2005), and different interpretations of patient's pain by different clinicians (Bozimowski, 2012). To correct inadequacy in the organizational culture, it is suggested that routine pain assessment be paired with nursing target interventions that are based on best practice guidelines (Carr et al., 2014).

Margo McCaffery, an internationally recognized registered nurse who has pioneered the field of pain management nursing, explained that one of the common reasons that a patient's pain is undertreated is that health care providers do not assess pain accurately (Seisser & Ward, 2002). McCaffery acknowledges that health care providers may disbelieve a patient's reported pain as they have been taught that pain is accompanied by changes in vital signs and by behavioural indicators, such as facial expressions and body language (Seisser & Ward, 2002). However, these indicators may only be present during sudden bouts of pain and may be short lived and are not reflective of the patient's ongoing experience of pain (Seisser &Ward, 2002). Researchers have found that patients may possess coping mechanisms that may affect attitudes of health care provider's beliefs about a patient's pain. Some patients cope with severe pain by joking, and can sleep despite the pain they are experiencing. Patients experiencing severe pain may also have normal vital signs and show no behavioural indicators that are

believed to accompany pain (Seisser & Ward, 2002). In response to this, nurses may believe that the patient is not in pain (Wentz & Warnock, 2006).

These views may be the remains from the traditional medical illness model. Drayer, Henderson, & Reidenberg (1999) found that nurses and physicians often felt that patients exaggerated their pain, and that pain was not as intense as was reported by the patient. Drayer et al. (1999) found that health care providers that used patient behaviours to aid in their assessment of pain may underestimate the pain intensity of stoic patients. Some of the common biases about pain include that substance abusers and alcoholics exaggerate their pain, patients who have minor illnesses have less pain compared to those with major illnesses, that the type of surgical procedure may indicate the amount of pain a person is expected to experience, and that giving regular analgesics will lead to addiction (Wentz & Warnock, 2006).

Another common misconception is the fear of addiction resulting from overuse of opioids for pain control (Seisser &Ward, 2002). Health care providers can easily mistake opioid withdrawal symptoms for addiction to the medication when, in fact, it is a normal physiological response of the body to the extended use of the medication for pain control (Seisser & Ward, 2002). Drayer et al. (1999) found that health care provider fear of inducing opioid addiction was the main reason patients were undertreated for their pain. This is also a common fear shared by patients that lead them to refrain or delay taking pain medication (Carr & Thomas, 1997; MacLellan, 2004). This is often a result of a lack of education regarding acute pain and pain management (Carr & Thomas, 1997; Eriksson et al., 2016; MacLellan, 2004).

An additional barrier to adequate pain control is the subjective interpretation of pain by the health care provider. Differing interpretations of the results of pain assessment tools may be evident between health care providers. These interpretations may also change from one patient to the next (Drayer et al., 1999) and may also be affected by the belief that if the patient does not display appropriate behavioural actions, then their pain is not as severe as they may claim. Zalon (1993) found that the higher the patient rated their pain intensity, the poorer the quality of the nurse's appraisal of pain. Although we may not be able to yield pain assessment free from all personal bias and opinion, it is essential that we try to standardize pain assessment producing more consistency in practice. Patients and health care providers may also interpret pain scales differently. van Dijk et al. (2012) found that what most patients in their study considered "bearable" pain on the numerical rating scale, health care providers considered to be "non-bearable". Without further investigating, this could lead to the patient being overmedicated (van Dijk et al, 2012).

There are many other obstacles that impede the appropriate management of pain in the surgical patient population. An additional barrier to an accurate assessment, is a lack of time for nurse-patient communication and adequate follow-up. Surgical units are busy with constrained staff-patient ratios thereby limiting extra time for extensive evaluations (Samuals & Fetzer, 2009). Inconsistent documentation of patients' pain was also an impediment to appropriate pain management in the surgical population (Carr et al., 2014; Francis & Fitzpatrick, 2013). Inadequate charting concerning pain assessment, intervention, and evaluation leaves the health care team with inadequate information with

which to modify the plan of care to complement the needs of individual patients (Abdalrahim et al., 2010).

The experience of pain may be difficult for patients to articulate. As a result, accurate assessment of pain can be equally difficult to appraise (Bozimowski, 2012). Coupled with a lack of knowledge of evaluating pain, inadequate assessment leads to inappropriate pain management strategies (Abdalrahim et al., 2010; Bozimowski, 2012; Francis & Fitzpatrick, 2013). The comprehensive assessment of pain is recognized as an essential element in treating pain appropriately (Carr et al., 2014). Nurses play a critical role in recognizing and assessing pain, and subsequently choosing the interventions that will make pain more tolerable. However, inadequate knowledge regarding pain management continues to be major obstacle in providing optimal care (Abdalrahim et al., 2010; Bozimowski, 2012; Carr et al., 2014).

Pain rating scales

Pain assessment tools are available for the nurse to use in the assessment of a patient's pain. They are meant to reflect the patient's pain intensity, giving the nurse an understanding of the pain by which they can base their intervention (Wentz & Warnock, 2006).

In Eastern Health adult care, two pain rating scales are recommended; the PQRST Pain Assessment Method (PQRST) and the numerical rating scale (NRS) (Sheppard, Goulding, Fulford, Earle, & Quinlan, 2012). The PQRST is recommended to be the first scale used to assess the patient's pain, and then followed up with the NRS. Pain is to be

assessed at the beginning of each shift, every four hours while the patient is awake, and following administration of pain medication. If the patient experiences any significant change in pain, it is recommended that the nurse complete a thorough assessment of the change in status (Sheppard, Goulding, Fulford, Earle, & Quinlan, 2012).

The PQRST is a pain assessment method that is meant to capture the patient's pain in detail and help the nurse in achieving a course of pain management. The pneumonic PQRST stands for provocation/palliation, quality/quantity, region/radiation, severity scale, and timing. The assessment includes a list of questions to ask with each letter of the pneumonic to obtain an in depth depiction of the patient's pain (Kirwan, 2010).

The NRS is recommended as follow up to the initial assessment of the PQRST. This scale is also included on the nursing forms for assessing pain in patients receiving CPNBs, epidural analgesia, and patient administered analgesia. It is also used as an assessment for all patients experiencing pain in Eastern Health as a follow-up to the PQRST (Sheppard, Goulding, Fulford, Earle, & Quinlan, 2012). The NRS is considered to be a valid and reliable pain assessment tool (Breivik, Bjornsson, & Skovlund, 2000; Good et al., 2001; Wells, Pasero, & McCaffery,). The NRS rating tool is also known to be a difficult concept for patients to grasp (Bozimowski, 2012). As well, ratings differ based on individuals own interpretation of the scale as has been already discussed, making it problematic in planning an effective pain management regime appropriate (Bozimowski, 2012).

A third rating scale used in Eastern Health is the Faces Pain Scale (FPS). This method of pain assessment is generally used in the paediatric population and has not been validated for use in adults who have undergone surgery (Van Giang, Chiu, Thai, Kuo, Tsai, 2015). The tool was developed by Wong and Baker in 1988 and consists of cartoon faces ranging from happy (no pain) to sad faces (severe pain) to depict how the child is feeling (Wentz & Warnock, 2006).

Pain assessment tools are available to nurses to aid in the assessment of pain such that pain can be treated accordingly. Idvall & Agneta (2008) found that pain assessment tools are not frequently used in care. Similarly, in an observational study by Dihle, Bjolseth, & Helseth (2006) pain assessment was not regularly completed, although nurses reported they were regularly evaluating pain. Although nurses understood the importance and effectiveness of pain assessment tools, they did not consistently use them (Layman Young, Horton, & Davidhizar, 2006). On the contrary, Niemi-Murola et al. (2007) found that nurses were using the visual analog scale (VAS) for pain assessment frequently in orthopaedic surgery.

CPNBs for pain management

Continuous peripheral nerve blocks are an accepted form of pain management for a number of different surgical procedures (Polomano, Rathmell, Krenzischek, & Dunwoody, 2008). This form of analgesia is limb specific and has been used to provide better pain control to patients, accompanied by fewer side effects such as nausea, vomiting, pruritis, respiratory depression, and ileus than traditional opioids (Capdevila,

Ponrouch, & Choquet, 2008; McCamant, 2006). While nerve blocks are initiated by an anaesthesiologist, it is nurse who cares for this system while it is in place. Nurses in Eastern Health are responsible for the assessment, care, and monitoring of the patients status and response to the treatment (Sheppard & Fulford, 2015).

Eastern Health CPNB policy (Sheppard & Fulford, 2015) guides the care of patients receiving CPNBs as a form of pain management. The registered nurse is responsible for monitoring the patient and the infusion rate, adjusting infusion rate as per order, and changing infusion bags. The nurse is also responsible to monitor the insertion site for signs of infection, monitor for systemic toxicity, and for signs of allergic reaction. The nurse must also assess pain level, vital signs, response to cold, and the patient's motor function. An anaesthesiologist is to be notified, and the frequency of monitoring and assessment increased should the patient's condition change (Sheppard & Fulford, 2015).

Nurses need a comprehensive understanding of peripheral nerve blocks, the physiology, assessment, adverse effects, and nursing care to ensure optimal outcomes for patients receiving this type of therapy (McCamant, 2006). Having a perceptive understanding of nerve blocks and their potential side effects will aid nurses in their assessment and in early recognition of adverse effects. Systemic toxicity is the most concerning complication of a nerve block as it can result in seizures, cardiac complications, and cardiac collapse (Capdevila et al., 2008; McCamant, 2006; Sheppard & Fulford, 2015). Nurses must be aware of the signs of toxicity and the required nursing

interventions in the event that it occurs (McCamant, 2006). Nurses need to also be aware of the symptoms of an allergic reaction in response to the nerve block medication, as well as be proficient in the care of dressings and the insertion site, and in monitoring for and recognizing signs of infection. It is important to watch for leaking or blood around the insertion site as it could mean that the catheter has migrated, and how to intervene should this occur. Tubing at the insertion site is a potential source of infection, and care should be taken to monitor for common signs of infection (McCamant, 2006; McGraw & Ilfeld, 2012). Prolonged untreated complications of nerve blocks could result in poor patient outcomes, impede recovery, and delay discharge from hospital.

Patients who receive CPNBs as a form of pain control typically do well postoperatively and report high levels of satisfaction (Anghelescu, Oakes, & Hankins, 2011; Le-Wendling & Enneking, 2008; McCamant, 2006; Turjanica, 2007). The orthopaedic population is of particular interest in this paper as total knee arthroplasty (TKA) (Anderson, Donnelly, Groose, Chambers, & Schroeder, 2014; Guarin, 2013; Le-Wendling & Enneking, 2008) and total hip arthroplasty (THA) receive excellent pain management and meet orthopaedic discharge criteria when given nerve blocks intraoperatively (Chelly, Ghisi, & Fanelli, 2010; Hebl et al., 2008; Le-Wendling & Enneking, 2008). Patients that have undergone TKA and have a CPNB meet orthopaedic goals quicker and with less pain than their counterparts who were prescribed traditional opioid analgesia (Anderson et al., 2014; Hebl et al., 2008). Anderson et al. (2014) found that orthpedic patients receiving CPNBs were able to ambulate quicker and further than those receiving epidural analgesia. They also experienced less nausea, pruritis, sedation,

urinary retention, and ileus formation (Anderson et al., 2014; Anghelescu et al., 2011; Finn et al., 2016; Hebl et al., 2008; Le-Wendling & Enneking, 2008; McCamant, 2006; Turjanica, 2007). Early ambulation is essential in patients undergoing TKA as limited mobility increases the risk for adhesions, capsular contracture, muscle atrophy, deep vein thrombosis, and pulmonary embolism (Anderson et al., 2014). Through earlier and painless range of motion, patients experience quicker recovery with CPNBs while the health care corporation benefits from cost savings (Anderson et al, 2014; Guarin, 2013; Hebl et al., 2008; McGraw & Ilfeld, 2012).

Patient and family education is a key element contributing to the successful outcome of a patient's recovery. Registered nurses play a large role in this task; they are often the people who provide education in a way that is understood by the patient and their family (McCamant, 2006). Patient education regarding CPNBs should include information regarding sensation and movement as nerve blocks affect motor ability and sensation. Patients need to be aware that motor ability will return before sensation, therefore the patient will be able to move before they can feel though they still may experience weakness (Grevstad, Mathiesen, Lind, & Dahl, 2014; Guarin, 2013; McCamant, 2006; McGraw & Ilfeld, 2012). This anticipated weakening, combined with the mechanical quadriceps weakness as a result of TKA can increase risk of falls (Chelly et al., 2010; Foisy, 2013) and patient teaching is required on expectation of aid for ambulation (Foisy, 2013). Due to changes in sensation, patients need to be cognizant of the importance of protecting skin from extreme heat or cold as they may not feel the effects. For the same reason, patients should also be advised from scratching or rubbing

the area (Guarin, 2013, McCamant, 2006). It is imperative that patients and their families are instructed on the significant side effects to watch for relating to toxicity or to allergic reaction of the medication. They should report occurrence side effects to a health care provider immediately (Guarin, 2013; Turjanica, 2007).

The experience of new nurses and nurses new to CPNBs

The transition from nursing student to graduate nurse has been recognized as a stressful and daunting experience for nurses. The experience of this transition has be extensively researched and its effects on new nurses well documented (Chernomas, Dean Care, Lapointe McKenzie, Guse, & Currie, 2010; Edwards, Hawker, Carrier, & Rees, 2015; Ketelaar, Nieuwenhuijsen, Frings-Dresen, & Sluiter, 2015; Spence Laschinger et al., 2016). New graduates are entering the workforce with a strong formal education but limited experience. These new graduates require ample time for orientation to become accustomed to the unit and develop time management skills (Chernomas et al., 2010). Due to the current nursing shortage, employers need new nurses to complete their short orientation and commence work functioning at the same level as an experienced nurse. This reality often amplifies the pressure new graduates feel, further resulting in apprehension about their role and career choice (Chernomas et al., 2010).

Nurses new to practice require support from their colleagues and to be embraced with a constructive learning environment that promotes confidence and competence (Chernomas et al., 2010). However, 39% of new graduates have reported that they have experienced horizontal violence and bullying in their new position. Ebrahimi et al. (2016)

discovered a lack of understanding and negative perceptions held by experienced nurses regarding transition of new graduates and their needs. This behaviour stems from the idea that new graduates are incompetent and inferior (Rush, Adamack, Gordon, & Janke, 2014). These feelings can be distressing to new nurses who already feel overwhelmed by their new and demanding responsibilities. This type of workplace mistreatment acts as barrier to nurses seeking out learning opportunities and increasing their scope of practice (Rush et al., 2014). New graduates report this intimidation discouraged them from asking for help when needed. This can increase the rates of clinical error, while contributing to poor work ethic and poor performance (Rush et al., 2014).

Interprofessional collaboration and effective communication abilities are essential for working in the acute care setting. New nurses often struggle with their ability to delegate work to support staff, thus overwhelming themselves with work that others can help with (Pfaff, Baxter, Jack, & Ploeg, 2014a). Communication with the interprofessional team is often a plight for new nurses. They often have little practical knowledge regarding when to consult, who to consult, and the appropriateness of a consult (Pfaff, Baxter, Jack, & Ploeg, 2014b). They lack confidence when communicating with physicians regarding their patient's status, and are unsure of how to communicate professionally (Pfaff et al., 2014a; Pfaff et al., 2014b). New nurses have difficulty communicating with their colleagues, in fear of being viewed as incompetent (Rush et al., 2014). This apprehension in communication can result in unpreparedness when placed in time-sensitive situations where they are expected to effortlessly perform tasks with little or no assistance (Ebrahimi, Hassankhani, Negarandeh, Azizi, & Gillespie,

2016). Pfaff et al. (2014b) considers this a performance gap that indicates a need for new graduate support to illicit confidence in their knowledge and skills.

New graduates identified the need for support and understanding from colleagues and management regarding their learning needs and expectations (Chernomas et al., 2010; Spence Laschinger et al., 2016). Nurses transition easier if they feel part of a group, feel supported by management, and feel that they are recognized as new and offered opportunity to learn (Chernomas et al., 2010; Spence Laschinger et al., 2016). Preceptors were identified as a resource that new nurses felt supported their transition. They felt that having a particular person during orientation aided in recognition of their individual learning needs and enhanced confidence levels (Chernomas et al., 2010).

Newly graduated nurses must apply critical thinking skills in practice. These skills are discussed extensively in formal education, however require personal experience in the clinical setting to flourish to maximum capacity (Fero, Witsberger, Wesmiller, Zullo, & Hoffman, 2009). Fero et al. (2009) found that 25% of newly graduated nurses had difficulty recognizing clinical problems and implementing appropriate nursing interventions. They further struggled with communicating appropriate clinical data, anticipating medical orders, and expressed difficultly in justifying their course of action. The ability to critically think and problem solve increases with practice and time; however a solid support system is essential to assist new graduates through complicated patient situations and thereby facilitate their competence and critical judgement (Fero et al., 2009; Spence Laschinger et al., 2016).

Experienced nurses who undergo job or role change also have a need for education and competence when faced with new skills and expectations. Nurses may face these changes due to the restructuring of health care and merging of facilities (Butt et al., 2002). Many nurses faced with job change felt like they had transferable knowledge and skills that applied to particular areas of patient care, however felt they required more knowledge on specific unit policies and procedures, protocols, and nursing interventions (Butt et al., 2002). It is essential to recognize the need for education in experienced nurses undergoing this type of change, and ensuring they have the support during their transition.

Registered nurses caring for CPNBs have specific learning needs that need to be addressed. They must be knowledgeable with respect to current evidence regarding the benefits and risks of CPNBs given their essential role in the coordination and execution of care plans for patients receiving this form of pain control (Blair & Clarke, 2013). Anderson et al. (2014) found that compared to pain management with epidural analgesia, patients who had TKA and were given femoral nerve blocks ambulated further, had decreased pain scores (Fletcher, Rigby, Hayes, 2003), experienced less nausea and pruritus, and used less opioids during the postoperative period (Anderson et al, 2014). Despite these findings, Anderson et al. (2014) found that nurses reported that femoral nerve catheters were associated with a delayed discharge, lesser pain control, and interfered with sleep and other patient activities. They felt that epidural analgesia provide better pain relief and preferred this method of pain control (Anderson et al., 2014).

Self-Directed Learning

Self-directed learning is important for nurses who are committed to lifelong learning and continued competency. Continued competency is a requirement by Newfoundland and Labrador's nursing regulatory body and professional association (Association of Registered Nurses of Newfoundland and Labrador, 2014). Self-instruction is a learning method which allows nurses to learn at their own pace (Rankin & Mitchell, 2000; Sparling, 2001; Turner, Clavarino, Butow, Yates, Hargraves, Conners, & Hausmann, 2009). This type of active learning is beneficial considering the time constraints and nature of a nurse's dynamic workplace. Its values are also in line with the values of Knowles' Adult Learning Theory (Sparling, 2001).

A self-learning module has specific objectives and goals. It is designed to overcome barriers related to workload, lack of time, and personal commitments that may impede accessibility of other learning programs (Rankin & Mitchell, 2000; Sparling, 2001). This type of platform allows learners to advance by setting their own pace, and direct the course of their own learning needs. It has also been found to be cost effective and far-reaching, accessing a larger group of people (Starling, 2001). Another advantage of this design is that new learning activities and resources can be added to the package over time. In addition, self-directed learning may promote further learning; nurses identify their own learning needs and may pursue further education on a particular subject (Starling, 2001). Despite the many benefits, there are also disadvantages to self-directed learning.

In developing a self-learning manual, disadvantages of this approach must be considered. Some nurse's struggle with motivation to complete this type of instruction, they may learn better with scheduled classes and with instructor-directed learning (Starling, 2001). Self-directed learning has been shown to be unfavourable for teaching of complex motor skills, which benefit from demonstration (Starling, 2001).

Rankin & Mitchell (2000) developed a self-instruction manual for nurses in hospice care that included information regarding pain assessment and management. These authors show that nursing reports improved documentation and better management of pain. Patients and their families also expressed increased satisfaction with pain management (Rankin & Mitchell, 2000). In an attempt to rate effectiveness of teaching strategies, Vidal et al. (2001) compared two different approaches for the delivery of information to staff. One learning strategy was a five day teacher-led course; the other was a self-directed learning module. The researchers found no statistically significant difference in outcomes of the two programs, other than the self-teaching module proving more cost-effective. Likewise, Willock (1998) conducted a study that compared the effectiveness of a self-learning module and traditional lecturing. It was found that there was no statistically significant difference between the measured outcomes (cogitative and skill demonstration) of the two programs. However, it was determined that once the self-learning module has been written, costs to maintain it are much cheaper than the cost of trainers for traditional lectures. Similarly, Turner et al. (2009) found that oncology nurses experienced improved knowledge, confidence, and communication skills when provided

an intervention using a self-learning manual on supportive care of cancer patients and a communication skills workshop.

The premise of self-directed learning is based upon the theory of Knowles' Adult Learning Theory (Starling, 2001). Self-directed learning modules have been recognized as a valuable method of continuing education for adult learners. They are convenient, accessible, cost-effective, and provide the learner with flexibility in training (Starling, 2001 Turner et al., 2009).

Learning Theory

This project of a self-learning manual on the care of CPNBs will require a theoretical framework on which the manual will be constructed. Patricia Benner's Novice to Expect Model and Knowles' Adult Learning Theory will be used as the principles illustrated in the theory are reflective of the values important to self-directed learning and continued competency.

Benner's Novice to Expert Model

Patricia Benner's Novice to Expert Model includes five levels of competence of the nurse: novice, advanced beginner, competent, proficient, and expert (Benner, 1982; Fero et al., 2008). This model has proven valuable in creating staff development programs similar to the one proposed in this project (Benner, 1982).

The novice nurse has no experience in the clinical area in which they are expected to work. They perform based on a set of rules that guide their actions (Benner, 1982). The

advanced beginner has more experience with complicated situations and can rationalize the nursing care that has been ordered. The competent nurse is able to effectively prioritize care. They plan care based on long-term goals and have become efficient in time management (Benner, 1982). At the proficient level the nurse becomes efficient in reflecting on previous situations and can effortlessly adapt the plan to the patient response. The expert nurse has a wealth of experience and knowledge, has developed intuition, and can anticipate the likely issue without need to consider all possibilities (Benner, 1982).

Benner's Model is directly applicable to this project. Nurses using this module will fall somewhere between novice to expert nurse in their individual practice, however any nurse that requires knowledge on CPNBs will benefit from the availability of the manual. Since nurses can direct their own learning needs with this type of resource, they can utilize whichever sections are relevant to them. This manual will be useful to nurses at all levels of Benner's Model; it will be useful to new nurses, nurses new to the orthopedic unit, nurses new to the skill of CPNBs, as well as nurses reviewing the skill of CPNBs.

Knowles' Adult Learning Theory

The principles of Knowles' Adult Learning Theory will also be applied in the development of this learning resource. Knowles' theory is based on the belief that the learner is invested in learning and is a willing participant in the learning experience (Mitchell & Courtney, 2005). The six principles on which the theory is based are: adults

need to know why they are learning, adults have to take responsibility for their own learning, the learners previous experiences should be built upon, the information should be relevant to their situation, they are motivated to learn, and information is to be problem centered using real examples (Mitchell & Courtney, 2005).

Both new and experienced nurses using the proposed manual will have a nursing care knowledge base comprised of a combination of formal education and experience as a nurse. It is essential that material builds on the previous knowledge of nurses. Knowles' theory respects the adult learner's previous experiences, and recognizes that their knowledge should be fostered and developed (Ludlow, Gaudine, & Jacobs, 2007). If nurses see the information in the manual as useful, they are more likely to embrace it. The information taught to adult learners will be integrated into their personal practice if they can relate it to prior experiences. In order to adopt the proposed information, learners must feel that the knowledge is relevant and will benefit their work performance (Ludlow et al., 2007; Mitchell & Courtney, 2005). It is important that they identify that the assimilation of this knowledge will improve their own practice and enhance patient outcomes through its application. This theory also suggests that adults are independent learners and will be successful with retaining information when learning is self-directed (Ludlow et al., 2007; Mitchell & Courtney, 2005). By incorporating each of Knowles' principles into its construction, the self-learning manual for nurses on the care of CPNBs should prove valuable to nurses for the care of patients receiving this form of pain management, thus making it more likely to be utilized.

Summary of Themes

Several key themes were identified throughout this literature review. Pain and the patient's experience of pain are key themes and pain has been highlighted as a significant problem for postoperative patients. Although there has been a considerable amount of research conducted, as well as nursing educational interventions implemented to resolve this issue, a large percentage of patients still continue to experience moderate to severe pain after surgery (Carr et al., 2014; MacLellan, 2004; Rawe et al., 2009). The presence of uncontrolled pain in the acute phase is linked to the development of chronic pain in the months following surgery (Canadian Pain Society, 2014). Pain is also linked to many other postoperative complications such as atelectasis, compromised immunity, deep vein thrombosis, and ileus (Duzel, Aytac, & Oztunc, 2013; Sloman, Rosen, Rom, & Shir, 2005; Weetman, 2009).

A second theme was how nursing knowledge and attitudes affect pain management. A lack of knowledge pertaining to the complexities of pain and pain management can result in surgical pain being significantly undertreated. There is also an identified gap between nursing beliefs about patient's pain, and the patient's actual experience of pain. This may stem from a lack of knowledge regarding pain and pain management (Abdalrahim et al., 2010; Bozimowski, 2012; Kohr & Sawhney, 2005; Sawyer et al., 2008).

A third theme is the experience of new nurses and nurses new to the care of CPNBs. Newly graduated nurses have few experiences to draw from. They also have a

knowledge base limited to what they had learned in their formal education. They rely heavily on the support from management and colleagues to help them meet their learning needs (Chernomas et al., 2010). It is important that adequate resources are available and nurses feel supported in achieving learning goals (Fero et al., 2009; Spence Laschinger et al., 2016).

A fourth theme is the importance of understanding the physiology behind CPNBs and the understanding of nursing care provided. The benefits of CPNBs on pain control, enhanced recovery for patients, and early discharge are well documented throughout the literature (Chelly et al., 2010; Hebl et al., 2008; Le-Wendling & Enneking, 2008). The adverse effects are also highlighted and are an essential part of knowledge that is required in providing care (McCamant, 2006; McGraw & Ilfeld, 2012). A thorough understanding of the care and rationalization of the interventions is imperative for optimal patient outcomes.

The last theme identified during this literature review is the value of continued competence and practicality of a self-directed learning manual for nurses. Nurses are interested in learning if the information is valuable and can be incorporated into their practice (Ludlow et al., 2007; Mitchell & Courtney, 2005). A self-directed learning manual allows nurses to define their own learning needs while learning at their own pace. The convenience and flexibility that this resource offers is important to its success in a dynamic and unpredictable work environment (Starling, 2001).

Conclusion and Implications

The preceding has been an integrated literature review to provide support for the development of a self-directed learning manual for nurses regarding CPNBs. I have presented information pertaining to pain and the patient experience of pain, nursing knowledge and attitudes on pain and pain management, pain rating scales, CPNBs for pain management, the experience of new nurses and nurses experiencing role/job change, self-directed learning, and learning theory.

A high percentage of patients have been found to experience pain in the postoperative period which can influence their outcomes, including post-surgical complications such as DVT and pneumonia. Several factors have been identified leading to undermanaged pain in the post-surgical patient. Pain can be difficult for patients to quantify, thereby also making it difficult to manage. In addition, nursing attitudes, knowledge, and beliefs regarding pain can be a major contributor to poor postoperative control. There are many misconceptions regarding pain and pain control that result in barriers to optimal management including the idea that patients exaggerate their level of pain and that pain is accompanied by changes in vital signs and behavioural cues. Additionally, pain rating scales may offer standardization of pain assessment, however they are not always consistently used in the measurement of pain.

CPNBs for pain management have many benefits and risks including excellent pain control, early ambulation, and improved deep breathing and coughing. However, CPNBs are not without risk. Some risks related to CPNBs are possible motor block and

systemic toxicity. Nursing knowledge and understanding of the care of a patient with a CPNB is essential in the assessment and management of this treatment option. It is important for new graduate nurses and nurses new to the use of CPNBs to understand the physiology behind the CPNB and be able to interpret assessment findings appropriately. Great significance is placed on the confidence and support required in obtaining competence in a new skill.

Self-directed learning has been identified to be an effective means of disseminating information to the nursing population. Benner's Novice to Expert Model and Knowles' Adult Learning Theory are pertinent theoretical frameworks for creating a self-directed learning manual for nursing caring for patients who have CPNBs. Benner's Model is based on the idea that nurses will exist somewhere on the continuum between novice and expert nurse. This allows nurses at any position to use the sections of the manual to their benefit. Knowles' Theory is founded on the belief that the learner is invested in learning and is a willing participant in the process. This provides support for a self-learning manual that will require the learner to direct application.

A self-directed learning manual on the care of patients with CPNBs would allow nurses a more meaningful rationalization for their nursing care and interventions. This resource would be beneficial to enhance patient outcomes in the orthopaedic surgery population in Eastern Health.

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Appendix A1

Qualitative Literature Review Tables

Nurse learning and transition.

Table 1

Title, Authors, Date, Study Objective	Sample/Groups (Size, Setting, Characteristics)	Design and Methodology	Key Results and Findings	Strengths/Limitations	Conclusion and Rating
Title: "Hit the Ground Running": Perspectives of New Nurses and Nurse Managers on Role Transition and Integration of New Graduates Authors: Chernomas, Dean Care, Lapointe McKenzie, Guse, & Currie	Sample: Nine participants from Phase 1 of the Workplace Integration of New Nurses (WINN) Project were recruited for the continuation of this project (13 months later). 16 nurses managers recruited. Setting: Winnipeg Regional Health Authority,	-Qualitative design. -Focus groups address broad topics of new graduate transition. -Focus group divided into an experimental group and a control group. -Items discussed were: experience with transition from student to nurse, things that	-Themes identified through content analysis: "Know who I am", "Know what I need", and "I feel prepared, but…". -"Know who I am" – new nurses want colleagues to know what it means to be a new nurse. -"Know what I need" – new	Strengths: -Themes explored in detail. Discussion of findings provided meaningful knowledge in understanding the transition of new graduates based on a new graduate and on nurse managers' perspective. - Study questions are broad in nature and themes are well defined. Limitations:	Appraisal based on scientific merit, clarity of research, methodological and theoretical assessment, rigour, discussion and conclusion, and ethical requirements. - This study provides an understanding the perspective of new nurses

(2010) Study Objective: To explore the perspective of new graduate and nurse managers on the transition of new graduates into the workplace.	Manitoba, Canada. Characteristics: - WINN Project designed in two phases. Phase one involved the effect of a Transition Facilitator Program on new nurse's transition, work stress, satisfaction, continuing education, and career planning.	helped/hindered transition, supportive people during the transition, and preparedness to practice. - Convenience sample of nurse managers. Focus group items: major issues in transitioning and retention, strategies used in transitioning and retention, and perceived challenges for new nurses.	nurses need the support and guidance of experienced nurses. - "I feel prepared, but…" – Many feel like they have a good knowledge base however, many skills still need to be developed. Working with the interdisciplinary team was essential.	-Ethical Review was not discussed. -Did not discuss informed consent or confidentiality plans.	orientating to a unit. By applying the supports identified as important, new nurses may function at an enhanced level more quickly and have a higher satisfaction. - This study provides support for the proposed project as it provides a detailed interpretation of challenges for new nurses, and issues in transitioning. Psychomotor skill preparedness was identified as a challenge for new nurses. The proposed manual would be of significant benefit

					in learning the skillset intended for caring for CPNBs.

Quantitative Literature Review Tables

Nurse learning and transition.

Table 2

Title, Authors, Date, Study Objective	Sample/Groups (Size, Setting, Characteristics)	Design and Methodology	Key Results and Findings	Strengths/Limitations	Conclusion and Rating
Title: The learning needs of nurses experiencing job change. Authors: Butt, Baumann, Deber, Blythe, & DiCertso (2002). Study Objective: To examine the perceived	Size & Setting: A survey was sent to all nursing personnel (RN's & LPN's) in two tertiary care teaching hospitals in Ontario, Canada (sample of 3408 staff). The response rate was 1728. Of the surveys returned, 828 of those met	- Statistical analysis preformed using SPSS. - Researchers used a mixed methods design. Quantitative approach using information from survey results. Information from a previous	-Nurses experiencing job change indicate that they require a moderate amount of new knowledge and development of new clinical skills. -Nurses moving to a new unit or hospital indicated	Strengths: - Reliability and validity tested for the instrument used in the study. Limitations: -Statistically significant results may be due to large sample size. Some of these results may not be clinically significant although they are	-This study is beneficial for nurse educators when planning orientations for nurses new to units, new to hospitals, or merging new roles while staying in their same unit. -This study exemplifies the

learning needs of nurses who are experiencing job change either to a new hospital, a new unit in the same hospital, or in merged units.	the criteria for experiencing job change and were used in this study. Characteristics: -Mean age of group 40.7. -85% of those surveyed were RN's And 15% were LPN's. -97.7% of all surveyed were female. -Education preparation and work arrangements varied. -Nurses survey results were divided into groups: 1) nurses experienced role change I their unit; 2) nurses moved to a different unit; 3) nurses moved to a different hospital.	qualitative study collected also. This provides quantitative insight to complement quantitative results. -Nursing Job-Change Survey questionnaire was developed for this study. Uses categorical response questions and 7 point Likert scale. Content related to job change included work environment, quality of care, organizational and professional commitment, learning needs, and orientation. - Questionnaire tested for content-	greater need for new knowledge and skill development. -Policy and procedures, patient protocol, technical procedures, & nursing interventions was largest percentage areas identified where nurses wanted knowledge. Disease conditions, medications, model of care, interdisciplinary practice, and medical treatment was second largest percentage area.	statistically significant. -Results may not be generalizable to all nurses who have experienced job change. - Results may not be generalizable to small, non-teaching hospitals. - No control group in this study for comparison. It would be beneficial to compare the study group to a control group who did not experience job change. This would provide insight into the extent and nature of learning needs required by those experiencing job change as opposed to the learning needs of those experience no change in role.	difference in learning needs of nurses experiencing different levels of job/role change. -According to PHAC appraisal too, this study is a moderate study design, medium quality. - This study provides support for the need for accessible educational resources for nurses new to a unit or new to a skill.

		related validity by experts. Pre-tested for face reliability and validity by a group of nurses. Test-retest reliability tested. -Ethics approval by McMaster University Ethics Review Committee and from 2 participating hospitals.			

Table 3

Title, Authors, Date, Study Objective	Sample/Groups (Size, Setting, Characteristics)	Design and Methodology	Key Results and Findings	Strengths/Limitations	Conclusion and Rating
Title: Critical thinking ability of new graduate and experienced nurses. Authors: Fero,	Size: 2144 newly hired nurses, within first two weeks of employment. Setting: 19 acute,	-Quantitative design, post hoc retrospective analysis. -De-identified data from files of	-25% of new nurses had difficulty in critical thinking ability and further recognizing and treating the	Strengths -Nurse raters completed 9-12 months of PBDS training. -Inter-rater reliability and rater competence	- This study can be helpful to clinical educators planning individualized orientations for nurses new to a

Witsberger, Wesmiller, Zullo & Hoffman (2009). Study Objective: To acquire the critical thinking learning needs of new graduates and experienced nurses with different levels of education (diploma, associate, Baccalaureate).	speciality, community, and regional hospitals in southwestern Pennsylvania, USA. Characteristics: -All employed by the same university healthcare system. -Sample of nurses were prepared at the diploma, associate, or Baccalaureate level. -Study took place from January 2004-September 2006.	the Nursing Education Department were collected. -Performance Based Development System (PBDS) used. Ten videotaped vignettes shown to nurses of common clinical issues. Nurses respond in writing regarding the problem, their actions, and rationale which is compared to the prepared answer. Items measured: problem recognition, reports essential clinical data, initiates independent nursing interventions,	clinical problem. - Positive correlation between meeting expectations and experience in Baccalaureate and associate prepared nurses. This trend not seen with diploma nurses. -Nurses with the least experience were less likely to meet expectations than nurses with most experience.	were assessed annually. -PBSD tool reliable and valid. Limitations: -Many demographics not available. -Some data missing from files on why expectations were not met. -Actions based on vignettes may differ from actual clinical actions.	unit. Educators can focus detail of information based on the nurse's current level of knowledge, and their capacity for understanding. -This study demonstrates the effect of experience on critical thinking evolvement. -According to PHAC appraisal tool, this study is of moderate design and medium quality. - This study provides support for the development of the critical thinking ability of nurses. The results provide a

		differentiation of urgency, anticipates relevant medical orders, and provides relevant rationale to support decisions. -Study approved from a university institutional review board. -SPSS used to analyze data.			foundation and justification for how material will be presented in the proposed project so that it is usable for nurses at all levels of critical thinking ability.

Table 4

Title, Authors, Date, Study Objective	Sample/Groups (Size, Setting, Characteristics)	Design and Methodology	Key Results and Findings	Strengths/Limitations	Conclusion and Rating
Title: Starting Out: A time-lagged study of new graduate nurses' transition to practice. Authors: Spence Laschinger, Cummings, Leiter, Wong, MacPhee, Ritchie, Wolff, Regan, Rheaume-Bruing, Jeffs, Young-Ritchie, Grinspun, Grunham, Foster, Huckstep, Ruffolo, Shamian, Burkoski, Wood, & Read (2016). Study Objective:	Size: 1st wave, 1020 of 3906 surveys returned. 2nd wave, 406 surveys returned. Setting: Across Canada Characteristics: Registered nurses with less than 3 years of experience and working in position with direct patient care.	- Quantitative design. Two wave survey. - Random sample of nurses from the provincial registry databases across Canada. -Surveys using standard questions mailed to nurse sample at home. - Information from data collected from nurses who responded to both surveys. - Information analyzed using SPSS.	- New graduates felt their transition was supported by management and colleagues. - New graduates felt that having a preceptor was also very helpful for a successful transition. - Variables that were found to support a positive transition include authentic leadership, structural empowerment, support for professional practice, new graduate support, and person-job fit. These variables affect the job	Strengths: - French questionnaire packets were provided if required. - Some surveys had data missing. To use these surveys and prevent bias, SPSS was used. - Design of study allowed measurement of outcomes over time. Limitations: - Use of self-report can result in response bias. - Low response rate from 1st wave to 2nd wave could result in selection bias. This may reduce generalizability. - Stress, burnout, and cynicism may have decreased survey responses.	- According to PHAC appraisal tool, the design is moderate and the study quality is moderate. - This study provides direction for managers to improve predictors to decrease turnover, prevent burnout, and increase job satisfaction. - This study provides support for the proposed project as it shows the importance and influence that

To address new graduates and the factors influencing job satisfaction and retention over a one year period.			satisfaction and retention rate of new graduate nurses on a nursing unit. - Comparing to 2nd wave results; management less dependable and person-job fit decreased with time. Also, nurses felt less empowered about their work. Burnout results were high.		perceived support has on the new graduate. Through providing accessible educational resources that is valued by the new graduate in their practice, job satisfaction may increase.

Perceptions of pain.

Table 5

Title, Author, Date, Study Objective	Sample/Groups (Size, Setting, Characteristics)	Design and Methodology	Key Results and Findings	Strengths/Limitations	Conclusion and Rating
Title: Patient perceptions of pain management therapy: a comparison of real-time assessment of patient education and satisfaction and registered nurse perceptions. Author: Bozimowski (2012). Study Objective: To determine if nurses perceptions of patient satisfaction with pain management	Sample: 50 patients, 25 patients from each of the 2 medical-surgical units. Setting: Community hospital in Detroit, Michigan. Characteristics: - Hospital has an annual discharge total of approximately 9000 patients. - Patients were either medical or surgical patients with nursing diagnoses related to pain.	-Survey evaluation. -Study approved by the Human Investigative Committee of Wayne State University and the Center for Clinical Research of the Detroit Medical Centre. -Convenience sample. -Survey interviews conducted by one investigator. - Chart reviews to determine pain self- reported rating, pain management plan,	-Patients level of satisfaction was similar to nurses perceived level of patients satisfaction. -Higher self-reports of pain associated with associated with lower satisfaction. -Patients who felt like they received adequate teaching on pain management, reported higher satisfaction. - Patients receiving PCA, oral analgesia, epidural analgesia, and	Strengths: -Confidentiality of patient information discussed with patient. - Study approved by ethics board. -Interviews completed by one interviewer, should help eliminate bias that may come from multiple interviewers. Limitations: - Small sample size. - No randomization in choosing participants. - Using only two units may limit generalizability. - Convenience sample which means study results will be difficult	- According to the PHAC critical appraisal tool, the study is a moderate design and of weak quality. - This study is relevant to the proposed project as it provides insight into nurses' perceptions of their patients' pain and compares it to the patients' report of pain. It also provides support to show nursing educational

is equivalent to patients self-report. Also, to determine if patients' satisfaction with pain management was related to the type of pain therapy and the sufficiency of education provided to the patient about pain management.		and primary diagnosis. -Patients asked level of satisfaction of pain management and reason. The primary nurse was asked their perception of the patients satisfaction. -Data analyzed using SPSS.	regularly timed doses reported higher satisfaction than those who received as needed IV analgesia.	to replicate and results may not be representative.	interventions affect patient satisfaction.

Table 6

Title, Authors, Date, Study Objective	Sample/Groups (Size, Setting, Characteristics)	Design and Methodology	Key Results and Findings	Strengths/Limitations	Conclusion and Rating
Title: Postoperative Pain: Nurses' Knowledge and Patients' Experience. Authors: Francis, & Fitzpatrick	Size: 31 nurses from the gastrointestinal and urology unit. -14 first and second day postop patients from these units.	Descriptive exploratory design. -Knowledge and Attitudes Survey Regarding Pain was used for nurses to assess nurses'	- The mean score for the nurses' survey was 69.3%. The mean score for the knowledge questions was lower than the mean score for	Strengths: -Clear inclusion and exclusion criteria. -Knowledge and Attitudes Survey used is deemed reliable and valid. Content and construct validity established. Test-retest	- Results of this study recommend a need for improved pain management postoperatively. -The study highlights the need for better

(2013). Study Objective: To explore nursing attitudes and knowledge regarding postoperative pain and look at patients pain experiences.	Setting: Large full service teaching hospital in eastern United States. Characteristics: - Patient participants underwent open and laparoscopic surgery and receiving PCA for pain management.	knowledge of pain management. - The short form McGill Pain Questionnaire (SF-MPQ) were given to patient to assess and describe pain intensity. - Institutional Review Board approval obtained for the study. -Written informed obtained from patients.	the attitude questions. Nurses had positive attitudes regarding pain management however, knowledge of how to treat pain appropriately was lacking. - Patient participant survey indicated that patients experienced moderate pain intensity.	and internal consistency reliability has be established. - SF-MPQ tested for validity and reliability. Limitations: - Sample size small and units specific, therefore unable to generalize findings to other surgery units.	pain management knowledge of staff. - According to PHAC critical appraisal tool, this study has a moderate design and is of moderate quality. -This study provides support for the proposed project as it highlights the deficiency in knowledge of pain management in nurses caring for a surgical population.

Table 7

Title, Authors, Date, Study Objective	Sample/Groups (Size, Setting, Characteristics)	Design and Methodology	Key Results and Findings	Strengths/Limitations	Conclusion and Rating
Title: Pain Prevalence Study in a Large Canadian Teaching Hospital Authors: Sawyer, Haslam, Robinson, Daines, & Stilos (2008). Study Objective: To assess the frequency of pain and the effect that it has on patient activity.	Size: 114 medical and surgical inpatients (72 surgical and 42 medical). Setting: Large teaching hospital in Toronto, Canada. Characteristics: - Study completed by five internal pain management nurse experts. - Data was collected on one day in November 2006. - More than 600 bed hospital. - Hospital has acute, palliative, and chronic pain teams.	- Cross sectional study. -Data collected in one day via questionnaires. - Brief Pain Inventory (short form) and McGill Pain Questionnaire (short form) self-administered to medical and surgical inpatients. - Research Ethics Board granted study approval.	-31.5%reported moderate to severe pain, and 11.4% reported severe pain.	Strengths: - Pain assessment tools used were both valid. - Staff not informed of study in attempt to eliminate potential bias. -Researchers worked with nursing team leader to identify patients who met inclusion criteria to help minimize selection bias. - Inclusion/exclusion criteria well defined. -Study provided opportunity for palliative care and acute pain nurses to connect professionally. Limitations: - Communication gaps between managers and nurse educators.	- Findings of this study could be used as a statistic strengthening the need for pain educational sessions for nurses in the clinical area -According to the PHAC critical appraisal tool, this study was moderate design and of moderate quality. - This study provides support for the proposed project as it indicates pain prevalence and it demonstrates how pain interferes

	- Staff were not informed of study.			- Additional data not collected as nursing few nursing units offered to assist. - Staff offended of not being notified of the study. - Study tools required patients to be able to read and write in English. - Low response rate of 41%	with patient activity. This is important as it provides support for the significance of pain management in decreasing post-surgical complications and in promoting enhanced recovery.

Effectiveness of CPNBs

Table 8

Title, Authors, Date, Study Objective	Sample/Groups (Size, Setting, Characteristics)	Design and Methodology	Key Results and Findings	Strengths/Limitations	Conclusion and Rating
Title: Does continuous peripheral nerve block provide superior pain control to opioids? A meta-analysis. Authors: Richman, Spencer, Liu, Courpas, Wong, Rowlingson, McGready, Cohen, & Wu (2006). Study Objective: To determine the effectiveness of CPNBs in managing pain	Size: 19 articles involving 603 patients were included in this study. Setting: John Hopkins University, Maryland. Characteristics: -Studies from 1966-2004 were searched. -Articles reviewed by two authors with a third author used to resolve disputes regarding inclusion/exclusion information.	- Meta analysis - Ovid Midline was searched for RCT articles comparing CPNB with opioids for postoperative pain. - Terms "pain" and "postoperative" yielded 14 752 articles. Added term "nerve block" yielded 7399 articles. Limits added: RCTs, human, and adults yielded 236 articles. Abstracts searched and yielded 37 articles. Article references added an additional 7 articles. Articles	- Perineural analgesia with local anesthetic provided better pain control than did opioids. - Perineural analgesia resulted in fewer side effects and improved patient satisfaction than did opioids in general. -Greater than 40% of patients who had orthopaedic ambulatory surgery experienced moderate to severe pain	Strengths: -Inclusion/exclusion criteria well defined. - Analysis completed to assess validity of conclusions. - Funnel plot completed to identify possible biases. Limitations: - The decrease in pain scores may not be clinically significant in indicating actual change in pain as scales are subjective in nature. - Several of RCTs were poor quality as 11/19 were double blinded with nerve catheters placed in	- This study provides evidence for clinicians and hospital units aiming to provide the most effective pain control options while balancing potential negative effects. - According to PHAC appraisal tool, the design is strong and the study quality is strong. -This study is relevant to the proposed project

as compared to opioid use. Also to evaluate side effects, opioid use, and patient satisfaction when compared to opioid use (parenteral and oral).		reviewed for inclusion/exclusion criteria, resulting in 19 articles. -Data collected from each study included methodology, peripheral nerve catheter data, opioid data, supplemental analgesic data, pain scores, dosage use and technique, major complications, minor complications. -Data analyzed using SPSS.	postoperatively. -Individual studies suggest pain control with nerve blocks improved patient satisfaction, better sleep patterns, improved rehabilitation, and shortened hospital stays.	both groups. - Studies were limited to English language articles. - Most of the methodology in the studies had no consistency in analgesic regimen.	as it provides support from several different studies on the benefits and risks of using CPNBs over opioids for pain management in the postoperative population.

Potential side effects of CPNBs.

Table 9

Title, Authors, Date, Study Objective	Sample/Groups (Size, Setting, Characteristics)	Design and Methodology	Key Results and Findings	Strengths/Limitations	Conclusion and Rating
Title: Fall Risk Associated with Continuous Peripheral Nerve Blocks Following Knee and Hip Arthroplasty Authors: Finn, Agarwell, Ilfeld, Madison, Ball, Ferguson, Morgan, & Morris (2016). Study Objective: To see if there is a relationship between the use of CPNBs and falls in patients who have undergone TKA or THA.	Size: 1541 patient falls examined. 2576 patients underwent TKA/THA within study limits. Setting: Large teaching hospital in southern California. Characteristics: - Review board waved informed consent. -Hospital provides care to a socioeconomically diverse population of patients.	- Retrospective cohort study. -Data collected from quality control records documenting falls. Fall rates from patients who had TKA/THA were collected before implementation of of CPNB (2003-2005) and after (2007-2010). This information was also compared to hospital-wide falls. - Study approved by the internal Institution Review	- Information analyzed using SPSS. - 473 falls from 2003-2005. None occurred in the 1182 TKA/THA. - 1041 falls from 2007-2010. 35 occurred in the 1394 THA/TKA who were treated with CPNB. - SPSS testing suggested a positive correlation with CPNB and fall risk. - Other factors with also examined. These included women fell more often	Strengths: -Each fall was extensively reviewed in the patients chart. Factors looked at were type of nerve block, pump settings, and circumstances of the fall (dizziness, hypotension, etc.) Limitations: - Retrospective design without control group. - Results not generalizable to patients who received single shot nerve blocks. - Not able to account for differences in patient population or hospital policy changes that may have	- Results from this study may help corporations and nurses identify considerations that affect fall risk and develop policy and intervention to help decrease the incidence of falls. - According to the PHAC critical appraisal tool, this study is a moderate design with strong quality. -This study provides support for the proposed

		Board.	than men, most patients were unattended at the time they fell, falls occurred more frequently during the day.	affected fall risk. - Nurses mobilization practice over the period of time had changed and was considered a confounder.	project as it highlights factors surrounding the nature of falls of patients receiving CPNBs as a form of pain control. This information can be included in the manual for educational purposes to help decrease falls in our patient population.

Forms of teaching/learning.

Table 10

Title, Authors, Date, Study Objective	Sample/Groups (Size, Setting, Characteristics)	Design and Methodology	Key Results and Findings	Strengths/Limitations	Conclusion and Rating
Title: Comparison of two training strategies for essential newborn care in Brazil. Authors: Vidal, Ronfani, da Mota Silveira, Mello, dos Santos, Buzzetti, & Cattaneo (2001). Study Objective: Compare the effectiveness of self-directed learning vs. conventional instructor-led course.	Size: Group1 - 128 doctors and nurses. Group 2 – 165 doctors and nurses. Setting: Eight hospitals in Pernambuco, Brazil. Characteristics: -Eight hospitals selected based on if researcher thought they had enough doctors and nurses and enough deliveries that could be observed over 4-5 days.	- The eight hospitals were divided into two groups of four, then paired based on similar characteristics. - Doctors and nurses made up the two groups. - Group 1were given the 5 day training course. Group 2 were given the self-learning packet. Sessions with facilitators were provided before and after the learning manual for discussion as required.	-Overall, group 2 scored higher than group 1 at the 3-6 month mark. - In summary, Group 1 improved some practices (improved thermal control on the ward, weighing the newborn, not using a feeding bottle), while Group 2 excelled in other practices (better thermal control at birth, hand washing before delivery, covering the mother and baby, keeping the	Strengths: -No differences between groups in terms of confounding variables. -Results may be generalizable, similar courses offered in many countries. Limitations: -Not all participants completed knowledge test. -Presence of observers may have altered practices. -Hospitals not randomly assigned.	- This research may be effective in terms of deciding which type of program to implement when concerned about cost-effectiveness. -According to PHAC critical appraisal tool, the study was a moderate design and moderate quality. - This study provides support for the proposed project as it provides rationale

		- Knowledge tested at baseline, after the course, and at 3-6 months. Participant practices also observed. This was used to compare the groups. - Data analyzed using SPSS.	newborn warm on the way to the ward, allowing family visits, bathing the newborn). -Knowledge improved in both groups. -There was no significant difference in improvements to practice with either strategy. -The self-directed manual was 20-25% cheaper to implement.		for choosing a self-directed learning module for the nursing population as the results were similar in both study groups. Self-directed course was less costly than the conventional course, requiring less organization.

Table 11

Title, Authors, Date, Study Objective	Sample/Groups (Size, Setting, Characteristics)	Design and Methodology	Key Results and Findings	Strengths/Limitations	Conclusion and Rating
Title: Enhancing the capacity of oncology nurses to provide supportive care for parents with advanced cancer: evaluation of an education intervention. Author: Turner, Clavarino, Butow, Yates, Hargraves, Conners, & Hausmann (2009) Study Objective: To evaluate the effectiveness of a self-directed learning manual and a day-long communication skills training workshop in	Size: 35 oncology nurses. Setting: Oncology unit of one of three hospitals in a metropolitan city in Australia. Characteristics: - Nurses who planned to stay in the oncology unit for at least the next 6 months were included. -25% of nurses eligible for the study expressed interest in participation.	-Quasi-experimental design, with pre- and post-training evaluation. -Intervention was a self-directed learning manual plus a communication skills training workshop (day long). -Workshops held 6-8 weeks after beginning to study to allow nurses time to complete learning manual. Workshops involved traditional teaching plus role play. - Participants completed	- There were no changes in stress and burnout of nurses before and after intervention. In measuring physiological morbidity, somatic scores decreased after intervention. -there was no significant change in stress. There was a change in nurses caring for their own mental health post-intervention. There was a significant increase in confidence of ability to provide support and information to families post-	Strengths: -Study was based on feedback of nurses. -Tools used were reliable and valid. Additional tool developed and used tested on nurses for content appropriateness before use in study. Limitations: -Small self-selected group of participants. -No control group making generalizability to other oncology nurses difficult.	- This research may be effective in providing nurse educators and managers with support and information on effective learning strategies. -According to PHAC critical appraisal tool, the study was a weak design and moderate quality. - This study provides some support for the project as it indicates that nursing knowledge,

enhancing the ability of oncology staff in providing support and information to children of parents with advanced cancer.		burnout questionnaire, general health questionnaire, and perceived stress, confidence and attitudes questionnaires were completed at recruitment, at completion of the workshop, and 6 months post workshop. - Knowledge assessed using vignettes at recruitment and post intervention. Themes identified and compared. - Skills assessed in simulated patient interviews. - Nurses were surveyed on the usefulness of the manual. They described the usefulness of the workshop.	intervention. - Pragmatic responses and referrals during vignettes decreased post-intervention and coping responses increased. - Communication of nurses with families improved significantly during simulated patient interviews. -Nurses who completed the final survey on usefulness of the intervention generally found the training helpful for practice.		confidence, and skills can be improved by using an educational self-learning manual and workshop.

		-Data analyze using SPSS. - Ethical clearance obtained from hospital. Nurses provided with written information about the study and consent sheets.			

Appendix B

Consultation and Environmental Scan Report

Natasha Martin (200215424)

Memorial University of Newfoundland

Consultation and collaboration competencies are an essential component in the development of quality improvement resources for nursing practice (Canadian Nurses Association (CNA), 2008). The use of these competencies during the consultation and environmental scan phase is important in the development of a self-directed learning manual for nurses regarding continuous peripheral nerve blocks. Through effective consultation and collaboration with members of the interdisciplinary team, pertinent information about the learning needs of the nursing population can be established (CNA, 2008). During the completion of the consultation phase for this project, the nurse educator for the surgery program, an anaesthesiologist, and both experienced and new graduate nurses were consulted. Through the environmental scan, advanced practice nurses working with acute pain services were consulted in Atlantic Canada to determine if they had a self-directed learning resource similar to the one proposed in this project and its effectiveness in their facility. This scan was extended using a pain management special interest group that is part of the Canadian Pain Society.

The following is a report of the consultations and environmental scan completed for this project. Throughout, I will explain the overall purpose of the project, provide a rationale for the consultations and environmental scan, provide information on the participants and the methods utilized, describe how the data was managed and analyzed, and discuss the results of the consultations and environmental scan. Finally, I will also describe how the data gleaned will be used in designing the practicum project.

Project Background

Continuous peripheral nerve blocks (CPNBs) have been identified in the literature as an excellent form of pain control for total knee arthroplasty (TKA) and total hip arthroplasty (THA) patients. As the Clinical Nurse Specialist for the Acute Pain Service at St. Clare's Mercy Hospital, I noted that some anaesthesiologists have been using single shot nerve blocks in the operating room in their recent practice for this patient population. When these patients reach the orthopaedic unit, nursing care post nerve block is sometimes uncertain. It is important for nurses to be knowledgeable in the care of nerve blocks to ensure optimal patient outcomes.

Many patients experience pain during the acute postoperative period (Carr et al., 2014; MacLellan, 2004; Rawe et al., 2009). Poorly managed pain can affect the outcomes of surgical patients by delaying ambulation, and increasing postoperative complications associated with restricted movement (Duzel, Aytac, & Oztunc, 2013; Sloman, Rosen, Rom, & Shir, 2005; Weetman, 2009). Pain can be difficult for patients to describe and to participate in the management, thereby making treatment decisions by the health care team difficult (Bozimowski, 2012). Additionally, nursing attitudes, knowledge, and beliefs regarding pain can contribute to poor postoperative pain management. Misconceptions regarding pain and pain control can act as a barrier to optimal pain management. Some of these misconceptions include the idea that patients exaggerate their level of pain, and that patients may become addicted to pain medication used to treat acute surgical pain (Abdalrahim, Majali, Warren Stomberg, & Bergbom, 2011;

Bozimowski, 2012; Kohr & Sawhney, 2005; Sawyer, Haslam, Robinson, Daines, & Stilos, 2008).

It is essential that nurses caring for patients receiving CPNBs have a thorough understanding of the assessment and management of this treatment option. Newly graduated nurses and nurses new to the care of CPNBs should understand the physiology, mechanism of action, and be able to assess and interpret assessment findings when caring for patients receiving CPNB (Fero, Witsberger, Wesmiller, Zullo, & Hoffman, 2009; Spence Laschinger et al., 2016).

A self-directed learning manual for nurses on the care of CPNBs will be developed as the project for this practicum. Such a manual is anticipated to be effective in the dissemination of information of CPNBs to nurses with varying levels of experience. Benner's Novice to Expert Model and Knowles' Adult Learning Theory will be used as theoretical frameworks as they illustrate qualities that are central in self-directed learning and its application to nursing practice (Ludlow, Gaudine, & Jacobs, 2007; Mitchell & Courtney, 2005; Starling, 2001).

This manual will include information on diverse types of nerve blocks as well as the indications for and the benefits of various blocks. Information about medications used in the block, potential complications, nursing assessment and management, and patient education will also be included. This manual will be available in print in the Acute Pain Service (APS) binders on each the nursing surgical units, ICU, and PACU within Eastern Health. It will also be available to the clinical educators of the surgery programs in

Eastern Health to be used as a resource in orientation and for reference. It will be located on the Eastern Health's Intranet, as well as attached as a link to the policy on CPNBs.

Rationale for Consultations and Environmental Scan

The overall purpose for this self-directed learning manual for nurses caring for CPNBs is to enhance the knowledge, confidence, and develop the skillset of nurses caring for patients receiving CPNBs for postoperative pain control. This manual will be easily accessible for nurses seeking information, such that it will be more likely to be used. Also, I aim to make this manual user-friendly to meet the learning needs of nurses ranging from novice to expert in their competency level (Benner, 1982). If nurses feel this knowledge is relevant to their practice, they will be more likely to use it (Ludlow, Gaudine, & Jacobs, 2007; Mitchell & Courtney, 2005).

Through completing consultations with key informants I sought to determine if this resource was going to be used, if it would improve nursing practice, and if it would improve nursing patient outcomes. I sought to establish, from the perspective of the key informants, the learning needs of nurses potentially using the manual, and the information that should be included in such a manual.

Through completing the environmental scan I aspired to gain information from other facilities in Atlantic Canada, as well as in other areas in Canada regarding the educational resources they have available. I hoped to find if the resource that they offer is similar to the resource I am proposing, and if it has helped improve practice of nursing

staff. I am also seeking the information they include in their resource. The rationale for the environmental scan is to ensure that the resource that I develop is on par with those available in other facilities. Through information gained from completing consultations with key informants and the environmental scan, I aim to create a product that will be effective in enhancing nursing knowledge and practice, and in optimizing patient outcomes.

Participants and Methodology

Consultations

The participants for this project included the clinical educator for the surgery program, an anaesthesiologist, three experienced surgical nurses (5+ years experience as an RN), and two new nurses (>/= 14 months experience as an RN). All interviews were completed between June 30th, 2016 and July 13th, 2016.

Through interviewing the educator for the surgery program at St. Clare's Mercy Hospital (SCMH), I aimed to acquire information regarding the perceived learning needs of nurses new to the skill of CPNBs. The educator plays a key role in orientation for newly graduated nurses and nurses new to a unit, as well as acting as a consultant for surgical nurses for skill related questions. An anaesthesiologist at SCMH was interviewed to gain his perspective on the physiology and mechanism of action of CPNBs. I also hoped to find from a medical perspective, what anaesthesiology considers important to be included in a manual for nurses. In interviewing both experienced and new surgical

nurses, I was seeking information on their perceived learning needs regarding CPNBs which hopefully would strengthen the support for development of the resource. Additionally, I hoped to retrieve information on where they would seek information before completing an unfamiliar skill and if they felt that learning resources are readily available. This information would determine feasibility of developing the resource and most likely determine if the resource would be utilized. Interview questions for key informants can be found in Appendix A2. Some questions were specific to the participant as can be seen in Appendix A2. Different questions were necessary as I anticipated that different disciplines would have different experiences, perspectives, and suggestions which would aid in the development of the manual.

The key informants were approached and given information about the project and its purpose. They were asked to participate in the interview to gain information for the project. Semi-structured interviews were used to collect data from the informants. This allowed for further exploration when necessary. The clinical educator was interviewed in her office, the anaesthesiologist was interviewed in his office, and the nurses were interviewed as two informal groups at their nursing station. The interview with the clinical educator lasted approximately 45 minutes, the interview with the anaesthesiologist lasted about 30 minutes, and the interviews with the registered nurses lasted approximately 45 minutes to 1 ½ hrs. The interviews with the nurses lasted longer due to the busy nature of where they were completed. This timing and location was preferred by the nurses. This location had both advantages and disadvantages.

Interviewing nurses together seemed to ease their comfort level of being interviewed as well as provided the opportunity to build on each other's answers. These interviews resembled a focus group setting. Being in the environment in which pain is normally experienced and managed may have aided in their ability to think clearly about pain management in their practice and draw upon experience. The location was problematic in that they would have to leave to tend patients, which may have affected elaboration of ideas. Generally, an interviewer would aim to choose an area with little distraction when completing interviews however, I think that being in their familiar and chaotic work environment helped participants focus on, and relate to the topic of pain. I would not do anything different in this situation as I feel the quality of the information gained was positively affected by the environment and their ability to discuss information and ideas. I collected notes during each interview.

Environmental Scan

An environmental scan was also completed during this phase. Other acute pain services in the Atlantic Provinces were contacted via phone to determine if they have a CPNB self-directed learning manual for nurses. As previously noted, I aimed to determine the effectiveness of the resource in increasing knowledge and confidence, and which information they included in the module. Questions for other acute pain services can be found in Appendix B2. Notes were taken while communicating with nurses from these pain services.

The acute pain services at the Victoria General site and Halifax Infirmary site in Capital Health, NS were contacted by phone. The acute pain service in Horizon Health, NB was also contacted by phone. I received return phone calls in 1-3 days and emails from them in 1-5 days. I also posted in the Canadian Pain Society pain special interest group to connect to other pain services in Canada. This group is made up of nurses who are focused on the clinical management of pain. I posted to this forum to inquire if they have self-directed learning manuals or other resources on the care of CPNBs at their facility. The post can be found in Appendix C2. I received responses from Peterborough Regional Health Centre, Peterborough, ON, University Health Network, Toronto, ON, and University of Alberta Hospital, Edmonton, AB, within 3-7 days and emails containing their resources within 4-15 days. All information was retrieved by July 19th, 2016.

Data Management and Analysis

All data from interviews were collected in person, using semi-structured interviews as to allow further examination in an area, if required. Participant responses were clarified as required to assure their views were accurately represented. All data from the interviews were reviewed and analyzed from the handwritten notes taken. Themes were identified from the interview information and represented and summarized in the 'Consultation Results' section to follow.

Information gathered from the environmental scan was reviewed and analyzed. The acute pain service nurses were asked questions regarding the CPNBs at their facility

and the manual that they use. Information from this environmental scan can be found in the 'Consultation Results' section to follow.

Ethical Considerations

The Health Research Ethics Authority (HREA) Screening Tool was completed and interpreted. Based on the score, this project is for quality improvement and as such, does not require research an ethics board approval. The HREA Screening Tool and Interpretation Key can be found in Appendix D2. As no patient information or confidential information was discussed or required, institutional permission was not required. Key informants were approached and asked to participate, and as such, consent was a verbal agreement and implied by participation. Prior to the beginning of each interview, I informed participants of the purpose of their project and how the data obtained from the interviews will be used. I also informed them to freely ask me to repeat or explain questions if necessary, and to not feel pressured to answer questions if they felt unsure of how to answer. Consulted participants were notified that as much as possible, identifying information from the interview would be omitted. All information found during the consultation and environmental scan phase is kept in a locked office, on a password protected computer, and on a password protected laptop.

Information emailed to me from pain services during the environmental scan was emailed to a secure email address. Pain services that were contacted were also informed of the purpose of this project and how this information would be used. They were also informed of my role in the acute pain service in Eastern Health, NL.

Consultation Results

Results of Consultations with Participants

Barriers to effective pain management.

The majority of participants stated that pain was not well controlled during the acute postoperative period. It was specified that body mass index and age played an important role in appropriate pain management; pain medication should be adjusted to reflect age and differing body weights. The elderly population may be more susceptible to confusion related to surgery and narcotics, making their pain more difficult to treat. Side effects were also identified as a barrier, for example, urinary retention can result in patient anxiety, further resulting in amplification of pain. Co-morbidities such as chronic pain may also contribute to ineffective pain control in the postoperative patient as having chronic pain can lead to the exacerbation of acute pain.

During consultations, pain was defined by a patient's previous experiences with pain; a previous negative experience could lead to anxiety in the present experience, affecting the patient's ability to play a part in their plan of care for pain. Further, patient education on appropriate pain management, failure to use patient controlled analgesia pumps, and fear of using narcotics out of concern for addiction all contribute to poor pain management.

Patients do not always let nurses know how much pain they are experiencing and therefore are not medicated accordingly which may be related to their cognitive ability to

understand and report pain. This may make ambulation more painful contributing to patients fearing that they could be damaging surgical hardware. A lack of thorough nursing assessment and treatment of pain, and lack of a multimodal approach in pain management can contribute to poor pain control.

Pain assessment.

Most participants felt that the Numeric Rating Scale (NRS) is effective for measuring pain, however during assessment, health care providers must consider that everyone has different pain experiences and therefore, may rate their pain differently. Nurses acknowledged that health care provider assumption of pain is not always accurate and the patient's report of pain should be weighed heavier than the health care provider assumption in the decision for pain treatment. Further, other pain scales or assessment may be more effective in those with dementia, nonverbal patients, or those suffering from addiction to narcotics. Pain rating scales were considered helpful in bringing attention to the fact that the pain regime may need to be adjusted or individualized based on patients' report of pain.

Educational needs for nurses.

Most participants identified that they would need further education in the area of CPNBs. Discussions during consultations included information about confidence levels when completing new skills. The majority of participants stated that like any other skill, nurses could quickly adapt and apply the skillset accompanying CPNB and that confidence would increase with education on the skill. They identified that SCMH was a

teaching hospital making it a more favourable place to learn new skills as there are assigned clinical experts to each unit. Being in a small hospital provides a feeling of community with staff and they would feel comfortable and supported in asking for help when completing a new skill. Anxiety can affect the nurses confidence, especially a newly graduated nurse with limited experience as they generally are already less confident in their skillset. A newly graduated nurse can be confident that they have learned nursing psychomotor skills, but completing the skill on a patient and interacting with the patient and the family can still be intimidating. Exhibiting confidence while performing the skill was specified as important such that the patient and the family are confident in the care they are receiving; sensing the nurse's lack of confidence can damage the nurse-patient therapeutic relationship.

All participants reported that there are not enough resources that are readily available to nurses staring out in orthopaedics. Participants reported that knowledge is typically gained from orientation and support from colleagues. Most participants reported they would look towards the policy, the Eastern Health intranet, the clinical educator, the nurse in charge, and the assigned clinical expert for the unit for information regarding CPNBs. The acute pain service and research articles were also mentioned as resources. Asking a colleague who was familiar with the skill to help was a common form of gaining knowledge and support. Easy access to a self-directed learning resource would help a nurse become confident in a new skill as it would increase their knowledge about the skill and the assessment.

General suggestions for inclusion in a manual were: indications for use of the block and the mechanism of action and duration of medications utilized, how and what to assess, usual side effects of CPNBs, potential adverse effects, what to do/who to contact when adverse effects noted, and the benefits of CPNBs.

Environmental Scan Results

During the environmental scan phase, pain service nurses were contacted in Nova Scotia and New Brunswick via telephone. Other pain services nurses in Canada were contacted via the Canadian Pain Society pain special interest group. These nurses were asked if they had a CPNB self-directed learning manual for nurses at their respective facilities. I received copies of the self-learning manuals from Horizon Health in New Brunswick, Capital Health in Nova Scotia, Peterborough Regional Health Centre in Ontario, and the University of Alberta Hospital in Edmonton, Alberta. They were also asked if the nurses found this manual effective to their practice and learning needs. All respondents reported that nurses utilized this manual, most frequently during orientations. All respondents felt that the manual increased nursing knowledge on caring for CPNBs, however no formal evaluation on its effectiveness has been completed. In addition, I inquired about the surgical populations are which CPNBs are used. Respondents reported that CPNBs were used for nephrectomies, thoracic surgery, amputations, orthopaedics, vascular (treatment of phantom limb pain), and plastic surgery (reattachment of digits).

Conclusion and Implications

The results of consultations with key informants and environmental scan have presented many implications for the development of a CPNB self-directed learning manual. The purpose for completing the consultations was to determine the usability of such a resource by nurses in Eastern Health. The purpose for completing the environmental scan was to ascertain if other pain services in Atlantic Canada had a similar resource, and if that resource was considered effective for surgical nurses in those facilities. From conducting both scans, it was determined that a self-directed learning manual on the care of CPNBs for nurses in Eastern Health would aid in enhancing knowledge, confidence, and developing the skillset of nurses caring for patients receiving this form of postoperative pain control. There was much information gained from consultations regarding barriers to effective pain management. Barriers included effectiveness of pain assessment, the usability of the Numerical Rating Scale, and common educational needs for nurses. The environmental scan gleaned information on content included in CPNB self-directed learning manuals in other facilities in Canada, as well as the manuals perceived usefulness.

Much of the information retrieved in the consultations with informants supported the results of the literature review. There was a mix of opinions from participants regarding the current effectiveness of pain control methods used for TKA and THA patients. Those who felt pain control was not completely effective attributed factors such as patients' comorbidities, age, and body mass index to this ineffectiveness and they

identified several barriers. Some of these barriers included lack of patient education regarding pain management, fear of addition, and the stigma associated with using narcotics. In addition, the effectiveness of the NRS was discussed by the participants. Most participants felt that the scale was effective in evaluating a patient's pain, while taking into account the subjectivity related to patient experiences. Nurses also felt that ineffective nursing assessments may act as a barrier to pain management. When discussing confidence and competence in completing a skill, such as a CPNB, participants felt that the skill was easily obtainable with some education on CPNBs. It was noted that there are not enough resources available for nurses starting on orthopaedics and that knowledge is presently obtained through support from colleagues. Participants felt that a CPNB self-directed learning manual would be utilized in their practice, and suggested information that would be important to include in the manual.

The consultations also uncovered information that was not present in the literature. Participants identified that SCMH is a teaching hospital with a community feel; this supportive environment contributes to an increase in confidence in completing new or unfamiliar skills. In addition, students assigned to a particular unit would gain exposure to the skills and build confidence in their knowledge. When nurses lack confidence in their own skills, it can affect nurse-patient therapeutic relationship, adherence to treatment regiment, and ultimately pain management. The availability of a self-directed learning manual would aid the nurse in increasing their knowledge base, and in turn, increasing their own confidence level in caring for CPNBs.

In this report the purpose of the project was provided and the rationale and importance of completing consultation with key informants and an environmental scan were discussed. Data collection, management, analysis, and ethical considerations were examined. The results from the consultations with key informants and the environment scan were provided and will have significant implications in the development of the manual. Through the results found in executing consultations and an environmental scan, a CPNB self-directed learning manual was deemed valuable for improving nursing practice and patient's pain outcomes, and therefore, will be developed.

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Appendix A2

1. Do you feel like acute postoperative pain is well controlled in orthopaedic patients who have had total knee arthroplasty and total hip arthroplasty? If no, then what do you feel are contributing factors to the management of pain in this patient population?
2. What do you think are some barriers to optimal pain control in this patient population? Explain.
3. Are pain scales valuable in assessing and treating a patient's acute postoperative pain? Explain.
4. Continuous peripheral nerve blocks (CPNBs) have been identified in the literature as an excellent form of pain management for this patient population. How comfortable do you think nurses would feel if caring for patients receiving a CPNB? Explain.
5. How knowledgeable should a nurse be in their assessment of a patient receiving a CPNB? Explain.
6. What are the adverse effects associated with CPNBs? Why is it important that nurses are able to identify these complications?
7. Would a learning resource manual for nurses on CPNBs would be valuable? Why or why not?
8. What information do you feel is important to include in such a manual for nursing?

Additional questions for clinical educator

1. Do you feel like a nurse's confidence and competence in caring for patients receiving CPNBs is important? Why or why not?
2. What contributes to nurses being confident in a new skill? Does anxiety affects a new nurse's confidence when preforming a new skill? Please explain.
3. How important is support from colleagues for the new graduate nurse who is caring for CPNBs which may be a new skill? Explain.
4. Are adequate learning resources available for new nurses starting on this unit? How are they presently gaining the knowledge and skills they require to work on this unit?

Additional questions for anaesthetist

1. What are some common questions you receive from nursing caring for CPNBs while you are on call?

Additional questions for experienced surgical nurse

1. Do you feel like a nurse's confidence and competence in caring for patients receiving CPNBs is important? Why or why not?
2. Would you feel confident in providing care to a patient receiving a CPNB? Why or why not?
3. Where would you seek information on the care of CPNBs?
4. What contributes to nurses being confident in a new skill? Does anxiety affects a new nurse's confidence when preforming a new skill? Please explain.

5. Would you feel comfortable calling the anaesthetist if you thought that your patient was experiencing an adverse effect of the CPNB? Why or why not?
6. How important is support from colleagues for the new graduate nurse who is caring for CPNBs which may be a new skill? Explain.
7. Does being assigned as a student nurse on this floor contribute to their confidence and knowledge once they become a registered nurse? Please explain.
8. Are adequate learning resources available for new nurses starting on this unit? How are they presently gaining the knowledge and skills they require to work on this unit?

Additional questions for new graduate nurse

1. Do you feel like a nurse's confidence and competence in caring for patients receiving CPNBs is important? Why or why not?
2. Would you feel confident in providing care to a patient receiving a CPNB? Why or why not?
3. Where would you seek information on the care of CPNBs?
4. What contributes to nurses being confident in a new skill? Does anxiety affects a new nurse's confidence when preforming a new skill? Please explain.
5. Would you feel comfortable calling the anaesthetist if you thought that your patient was experiencing an adverse effect of the CPNB? Why or why not?
6. How important is support from colleagues for the new graduate nurse who is caring for CPNBs which may be a new skill? Explain.

7. Does being assigned as a student nurse on this floor contribute to their confidence and knowledge once they become a registered nurse? Please explain.
8. Are adequate learning resources available for new nurses starting on this unit? How are they presently gaining the knowledge and skills they require to work on this unit?
9. If assigned to a patient receiving a CPNB, would you feel supported by your colleagues while caring for this patient?

Appendix B2

1. Do you have a CPNB self-learning manual at you facility for nurses?
2. Do nurses at your facility find this manual valuable to their practice?
3. What surgical populations are CPNBs most frequently used at your facility?

Appendix C2

Environmental scan post to acute pain services for the interest group

painnursing_cps_sig

Attn: Acute Pain Services,

My name is Natasha Martin and I am the Clinical Nurse Specialist for the Acute Pain Service at St. Clare's Mercy Hospital in St. John's, NL. I am currently a Master of Nursing student at Memorial University of Newfoundland.

As a project for a practicum course, I plan to develop a self-learning manual on the care of continuous peripheral nerve blocks for the nursing staff who work on the surgical units of this hospital. In order to assist me with areas of knowledge to focus this project, I am hoping to obtain some information from you. It would be very beneficial and appreciated if you could provide me with information regarding any learning resource manuals on continuous peripheral nerve blocks that you have available to nurses in your facility. This information would help me to focus the content of my manual. Any additional information that you could provide on your manual would also be very helpful (if nurses find the manual useful, if the manual helped increase knowledge, confidence levels, and care provided by nurses in your facility caring for CPNBs).

I am available by phone at (709) 777-5120 or via email at natasha.martin@easternhealth.ca. Your responses would be most appreciated on or before July 15th, 2016.

Thank you for your time and cooperation.

Kind Regards,

Natasha Martin BSc BNRN

Appendix D2

Health Research Ethics Authority Screening Tool

	Question	Yes	No
1.	Is the project funded by, or being submitted to, a research funding agency for a research grant or award that requires research ethics review	❒	☒
2.	Are there any local policies which require this project to undergo review by a Research Ethics Board?	❒	☒
	IF YES to either of the above, the project should be submitted to a Research Ethics Board. **IF NO** to both questions, continue to complete the checklist.	❒	☒
3.	Is the primary purpose of the project to contribute to the growing body of knowledge regarding health and/or health systems that are generally accessible through academic literature?	❒	☒
4.	Is the project designed to answer a specific research question or to test an explicit hypothesis?	❒	☒
5.	Does the project involve a comparison of multiple sites, control sites, and/or control groups?	❒	☒
6.	Is the project design and methodology adequate to support generalizations that go beyond the particular population the sample is being drawn from?	❒	☒
7.	Does the project impose any additional burdens on participants beyond what would be expected through a typically expected course of care or role expectations?	❒	☒
LINE A: SUBTOTAL Questions 3 through 7 = (Count the # of Yes responses)		**0**	
8.	Are many of the participants in the project also likely to be among those who might potentially benefit from the result of the project as it proceeds?	☒	❒
9.	Is the project intended to define a best practice within your organization or practice?	☒	❒
10.	Would the project still be done at your site, even if there were no opportunity to publish the results or if the results might not be applicable anywhere else?	☒	❒
11.	Does the statement of purpose of the project refer explicitly to the features of a particular program, Organization, or region, rather than using more general terminology such as rural vs. urban populations?	☒	❒
12.	Is the current project part of a continuous process of gathering or monitoring data within an organization?		**x**
LINE B: SUBTOTAL Questions 8 through 12 = (Count the # of Yes responses)		**4**	

	SUMMARY **See Interpretation Below**		

Interpretation:

- If the sum of Line A is greater than Line B, the most probable purpose is **research**. The project should be submitted to an REB.
- If the sum of Line B is greater than Line A, the most probable purpose is **quality/evaluation**. Proceed with locally relevant process for ethics review (may not necessarily involve an REB).
- If the sums are equal, seek a second opinion to further explore whether the project should be classified as Research or as Quality and Evaluation.

These guidelines are used at Memorial University of Newfoundland and were adapted from ALBERTA RESEARCH ETHICS COMMUNITY CONSENSUS INITIATIVE (ARECCI). Further information can be found at: http://www.hrea.ca/Ethics-Review-Required.aspx.

Appendix C

Nursing 6661

Self-Directed Learning Manual for Registered Nurses: Continuous Peripheral Nerve Block

Natasha Martin (200215424)

Memorial University of Newfoundland

Table of Contents

Introduction

Pain management of the postoperative patient is a priority of the entire health care team. Effective pain management during the postoperative period supports multi-system regulation. Appropriate pain control aids in the patient's ability to ambulate and to deep breathe and cough which helps to prevent atelectasis and deep vein thrombosis, while promoting wound healing (Duzel, Aytac & Oztunc, 2013; Sloman, Rosen, Rom, & Shir, 2005). Managing pain at a tolerable level for the patient during the acute postoperative period will aid to enhance recovery and have lasting effects for patient well-being (Anderson et al., 2014).

Peripheral Nerve Block (PNB) is a form of regional anaesthesia that is effective in treating pain in certain postoperative patient populations. This is achieved either by injecting local anaesthetic near the peripheral nerve or nerve plexus via single dose (single injection peripheral nerve block) or by using a catheter for continuous infusion (continuous peripheral nerve block). This manual will provide the reader with information to care for continuous peripheral nerve blocks.

Learning Objectives

After completing this self-directed learning manual, the Registered Nurse should be able to:

1. State the indications for use of continuous peripheral nerve blocks (CPNBs).
2. Identify the anatomical locations of and understand targeted areas for pain control of the different types of CPNBs.
3. Identify the medications used in CPNBs.
4. Describe the benefits of CPNBs for pain management.
5. Describe the potential complications associated with CPNBs.
6. Describe the nursing assessment and management required in caring for a patient receiving a CPNB.
7. Describe the patient education that is required for a patient receiving a CPNB.
8. Understand the Acute Pain Service role in the care of a patient with a CPNB.

* While the content of this manual pertains to CPNBs, much of the information regarding both single injection nerve blocks and CPNBs may be very similar. With respect to single injection nerve blocks, the effects of the block will wear off more quickly than with a CPNB. The medication used for both may be the same, and both are relevant in pain management however, the focus of this manual is on the care of CPNBs.

Glossary

Pain – "an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage" (International Association for the Study of Pain (ISAP), 2014).

Acute Pain – pain that last for a short period of time. This pain is usually associated with the damage of tissue, such as with injury or secondary to a procedure. This pain is usually somatic or visceral (McCaffery & Pasero, 1999).

Anaesthesia – "the absence of normal sensation, especially sensitivity to pain, as induced by an anaesthetic substance or by hypnosis or as occurs with traumatic or pathophysiologic damage to nerve tissue. Anaesthesia induced for medical or surgical purposes may be topical, local, regional, or general and is named for the anaesthetic agent used, the method or procedure followed, or the area or organ anaesthetized" (Anderson, Anderson, & Glanze, 1998, p. 87).

Analgesia – "a decreased or absent sensation of pain" (Anderson, Anderson, & Glanze, 1998, p. 82).

Single Injection Peripheral Nerve Block – local anaesthetic is injected near the peripheral nerve or at the nerve plexus as a one-time dose to achieve pain control (Jeng & Rosenblatt, 2016).

Continuous Peripheral Nerve Block - local anaesthetic is infused continuously via a catheter placed near the peripheral nerve or at the nerve plexus to achieve pain control (Turjanica, 2007).

1. Pain

Pain is defined as “an unpleasant sensory and emotional experience arising from actual of potential tissue damage, or described in terms of such damage” (International Association for the Study of Pain (ISAP), 2014).

Pain is an experience that is very difficult to define as it is a very subjective encounter that can only be described by the patient themselves (Francis & Fitzpatrick, 2013). Margo McCaffery, a registered nurse who has been a pioneer in the study of pain and nursing pain management, defines pain as “…whatever the experiencing person say it is, existing whenever he says it does” (Seisser & Ward, 2002, p. 19). The patients self-report of pain is considered to be the most reliable and accurate measurement (Seisser & Ward, 2002).

It is expected that patients will experience some level of pain after a surgically invasive procedure. It is also expected that thorough assessment and appropriate pain management intervention should prevent pain from occurring at an unbearable level (Abdalrahim, Majali, Warren Stromberg, & Bergbom, 2011; Carr et al., 2014). A detailed assessment will provide the clinician with a foundation on which to base intervention (MacLellan, 2004; Carr & Thomas, 1997). The principal objective of postoperative pain management is to keep postoperative pain at a tolerable level.

Treating postoperative pain aids in ensuring optimal patient outcomes. Well controlled pain helps to decrease postoperative complications such as anxiety, sleep disturbance, hypertension, tachycardia, nausea and vomiting, atelectasis, and deep vein thrombosis (McLean, Martin, Cousley, & Hoy, 2013). When pain is kept at a tolerable level, patients are more likely to benefit from early ambulation, complete deep breathing and coughing exercises, and work efficiently with physiotherapy (Duzel et al., 2013; Sloman et al., 2005; Weetman & Allison, 2006). This fosters enhanced recovery (Finn et al, 2016; Hebl et al., 2008; MacLellan, 2004) and decreases the patient’s length of stay in hospital (Finn et al., 2016; Hebl et al., 2008; MacLellan, 2004; Turjanica, 2007).

Figure 1: Pain. Retrieved from: Microsoft Word Clipart. Used with permission from Microsoft.

According to the Canadian Pain Society (2014), pain is undertreated in the postoperative patient population, with 50% of patients reporting moderate to severe pain after their surgical procedure. It is projected that 10-50% of patients continue to suffer from persistent pain well past the acute postoperative period (Canadian Pain Society, 2014). Poorly managed pain in the postoperative period has been associated with the development of chronic pain (Abdalrahim et al., 2011; MacLellan, 2004; IASP, 2011). Although some patient have learned to cope, adjusting their lives to adapt to the pain, (Sikorski & Barker, 2005) chronic pain can be very debilitating to many activities of daily life (Canadian Pain Society, 2014). Chronic pain has been linked to anxiety, depression, social withdrawal, chronic fatigue, and difficultly with work (Sikorski & Barker, 2005).

2. Anatomy of the Peripheral Nervous System

The peripheral nervous system (PNS) is comprised of 31 pairs of spinal nerves and 12 pairs of cranial nerves. Smaller nerves that subdivide from these main nerves are also part of the PNS. These nerves are essentially pathways that deliver messages and impulses to and from the brain that control motor and sensory capabilities (Thibodeau & Patton, 2007).

All 31 spinal nerves are attached to the spinal cord and are numbered to reflect the part of the vertebral column they emerge from (Thibodeau & Patton, 2007). There are seven cervical vertebrae and eight cervical nerve pairs (C1 to C8), twelve thoracic nerve pairs (T1 to T12), five lumber nerve pairs (L1 to L5), and five sacral nerve pairs (S1 to S5) (Thibodeau & Patton, 2007).

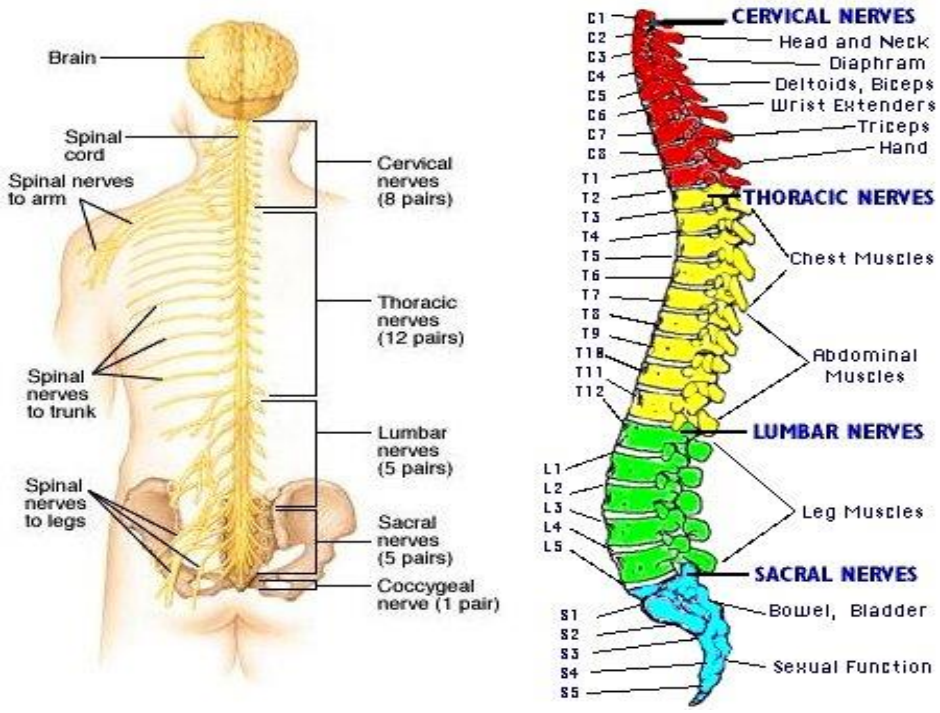

Figure 2: Spinal Nerves. Retrieved from: Microsoft Word Clipart. Used with permission from Microsoft.

The spinal nerves are joined to the spinal cord via two roots, termed the ventral and dorsal root. The ventral root allows passage of motor impulses from the central nervous system to the muscles. The dorsal root allows passage of sensory information (Thibodeau & Patton, 2007).

The nerve then extends into large branches, each one called the ramus. The ramus then breaches into the dorsal ramus and the ventral ramus. The dorsal ramus provides motor and sensory information to smaller nerves supplying the posterior head, neck, and truck. The structure of the ventral ramus is more complex as it splits and re-joins to create two rami. Its role is effectively to supply motor and sensory information to the muscles and glands of the arms, legs, and lateral and ventral aspects of the neck and trunk (Thibodeau & Patton, 2007).

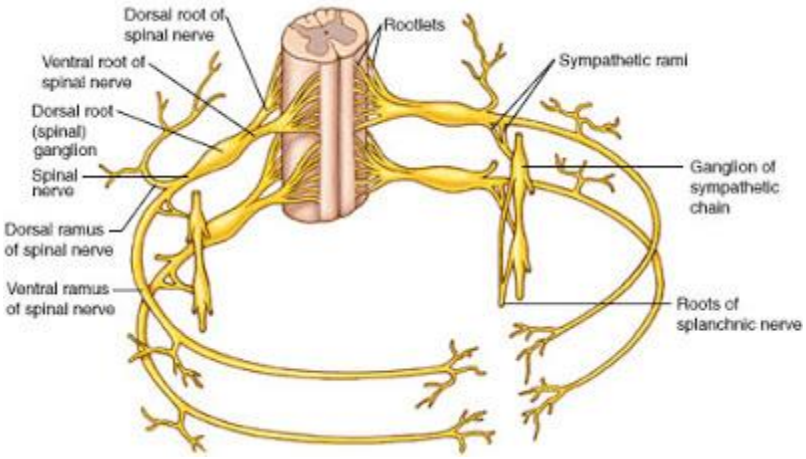

Figure 3: Spinal Nerve. Retrieved from: Microsoft Word Clipart. Used with permission from Microsoft.

The ventral rami (except from nerves T2-T12, no plexus formed as they run directly into the intercostal muscles and skin) divide into a network of nerves called plexuses. The four pairs of plexuses are: the cervical plexus, the brachial plexus, the lumbar plexus, and the sacral plexus. The nerves that form from each the plexus influence specific regions of the body (Thibodeau & Patton, 2007).

- Cervical Plexus – located in the neck. Involves nerves C1-C5. Innervates the muscles and skin of the neck, the upper shoulders, and a portion of the head. The phrenic nerve also branches from this plexus; it innervates the diaphragm (Thibodeau & Patton, 2007).
- Brachial Plexus – located in the shoulder. Involves nerves C5-T1. Innervates the lower shoulder and the entire arm (Thibodeau & Patton, 2007).
- Lumbar Plexus – located in the lumbar area of the back, near the psoas muscle. Involves nerves L1-L4. Innervates the thigh and leg (Thibodeau & Patton, 2007).
- Sacral Plexus – located in the pelvic cavity, anterior of the piriformis muscle. Involves nerves L4-S4. Innervates the skin of the leg, the posterior thigh muscles, and leg and foot muscles (Thibodeau & Patton, 2007).
- Coccygeal Plexus – small plexus. Involves nerves S4-S5. Innervates pelvic cavity floor and surrounding areas (Thibodeau & Patton, 2007).

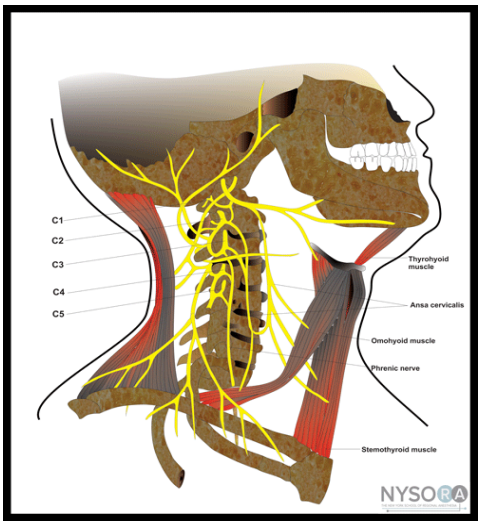

Figure 4: Cervical Plexus. Retrieved from: http://www.nysora.com/regional-anesthesia/foundations-of-ra/3216-essentials-of-regional-anesthesia-anatomy.html

Each spinal nerve innervates a part of the body. A dermatome is the section of the skin that is innervated by particular spinal nerves. Level of sensation can be assessed using dermatomes (Thibodeau & Patton, 2007) where ice in a glove is used to assess the level of sensation. The cold glove is placed on the patient's skin along each dermatome on both the blocked and the non-blocked limbs. The area where the patient states that sensation changes, is noted. The non-blocked limb is used as a comparison for the patient as there should be no change in sensation of the unaffected limb.

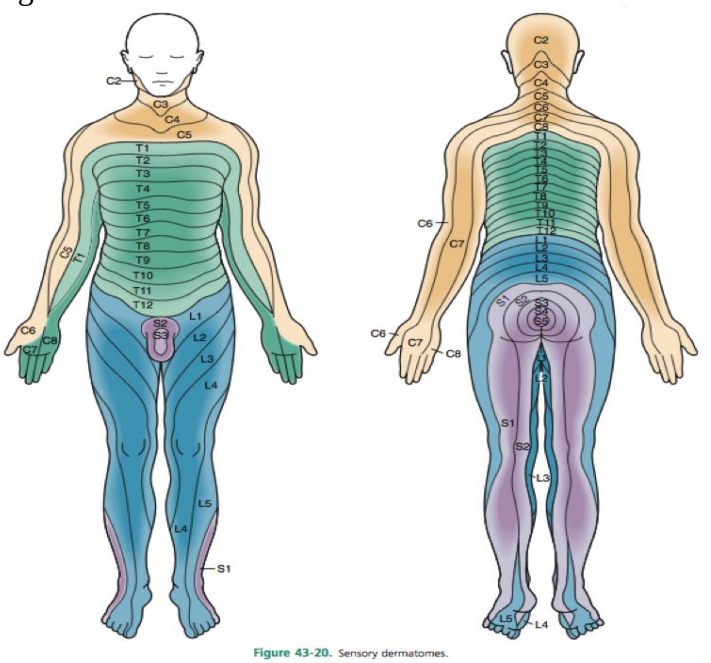

Figure 5: Dermatomes. Retrieved from: Microsoft Word Clipart. Used with permission from Microsoft.

A myotome is a group of muscles that is innervated by particular spinal nerves. Motor control is assessed and can be associated with the level of nerve involvement (Thibodeau & Patton, 2007). This assessment is completed by using the Bromoge Score. Patients are asked to complete tasks associated with the Bromage score table, and a grade of block is assigned depending on their ability.

Description of the Bromage Score:

Grade	Definition Lower Limbs
0	No motor block
1	Inability to raise extended leg; able to move knees and feet
2	Inability to raise extended leg and move knee; able to move feet
3	Complete block of motor limb

Grade	Definition Upper Limbs
0	No motor block
1	Inability to extend arm
2	Inability to extend arm or flex forearm
3	Complete block of motor limb

(Retrieved from: Sheppard, P. & Fulford, N. (2015). Continuous peripheral nerve block (adult - acute care). Eastern Health Policy PRC – 025, 1-6)

3. Indications for Continuous Peripheral Nerve Blocks

- Continuous peripheral nerve blocks are used for post-operative pain management of orthopaedic surgery, thoracic surgery, gastrointestinal surgery, vascular surgery, and limb amputations. It is also used in acute pain management of phantom limb pain (Wildsmith, Armitage, & McClure, 2003)
- Continuous peripheral nerve blocks can be used as a form of pain management when opioids are not preferred (patients at risk of respiratory depression – obstructive sleep apnea, severe obesity, pulmonary disease, advanced age) (Jeng & Rosenblatt, 2016).

4. Types of Continuous Peripheral Nerve Blocks

4.1 Upper Extremity Blocks

The Brachial Plexus

The brachial plexus is comprised of the nerves that stimulate the arm and involves the fifth cervical nerve to the first thoracic nerve roots (C5-T1).

The effect of the block on the upper extremity depends on which area of the brachial plexus is given anaesthetic agent. There are four main approaches in providing a brachial plexus block: a) interscalene, b) supraclavicular, c) axillary, and d) infraclavicular (Fischer, 2003). A nerve catheter can be inserted near the brachial plexus, which can then be used to provide continuous infusions or intermittent top-up injections to extend the effect of the block (a nerve catheter is a medication administration catheter that is inserted near a nerve or nerve plexus that can be used to provide intermittent boluses or continuous infusions) (Fischer, 2003).

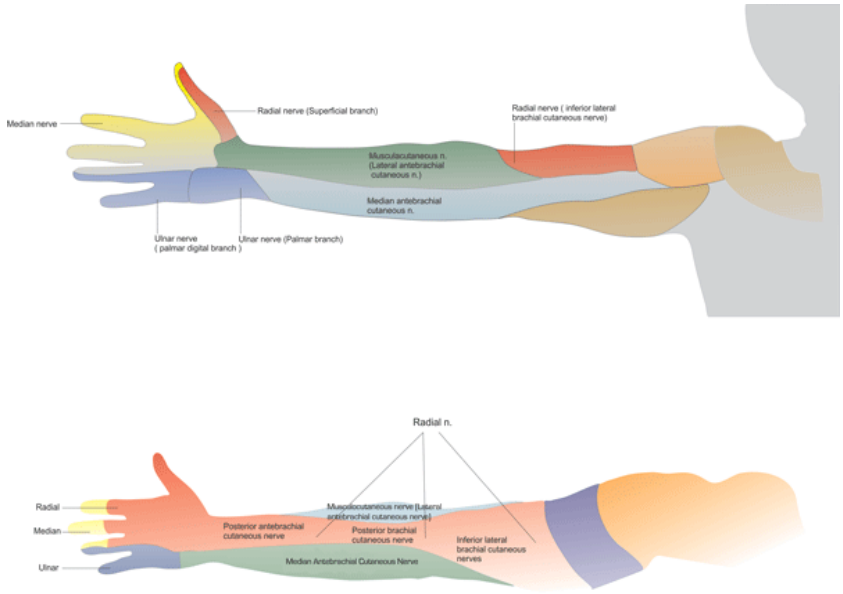

Figure 6: Sensory distribution of the brachial plexus. Retrieved from: http://www.nysora.com/techniques/nerve-stimulator-and-surface-based-ra-techniques/upper-extremitya/3346-interscalene-brachial-plexus-block.html

a). Interscalene Block

This block is indicated for shoulder, arm, and elbow surgeries (New York School of Regional Anaesthesia (NYSORA), 2013). Example: shoulder arthroplasty, insertion of arteriovenous graft for hemodialysis.

This approach blocks cervical nerves C5-C7 of the brachial plexus. The nurse should expect numbness to the shoulder, clavicle and radial aspect of the arm and hand. The patient may have sensation to the ulnar aspect of the hand and arm (Fischer, 2003).

This approach is associated with side effects. These include:

- Phrenic nerve block – patients with this type of block experience paralysis of the diaphragm on the side that is blocked (Fischer, 2003). Patients may experience dyspnea (Morgan, Mikhail, & Murray, 2002). This is usually well tolerated in patients without significant chronic respiratory disease, such as COPD (Fischer, 2003).
- Laryngeal nerve block – voice hoarseness due to affected vocal cords on the side that is blocked (Mele, Strawley, & Goldschmidt, 2015; Fischer, 2003).
- Sympathetic nerve block (Horner's Syndrome) – patients may experience facial flushing, drooping eyelid, bloodshot conjunctiva, and pupil constriction on the side of the block (Mele et al., 2015; Morgan et al., 2002).
- This approach has an increased risk of intra-arterial injection which can result in seizures and central nervous system toxicity (Morgan, et al., 2002).
- Although rare, this approach can result in a pneumothorax (from inadvertent pleural puncture) (Morgan et al., 2002).

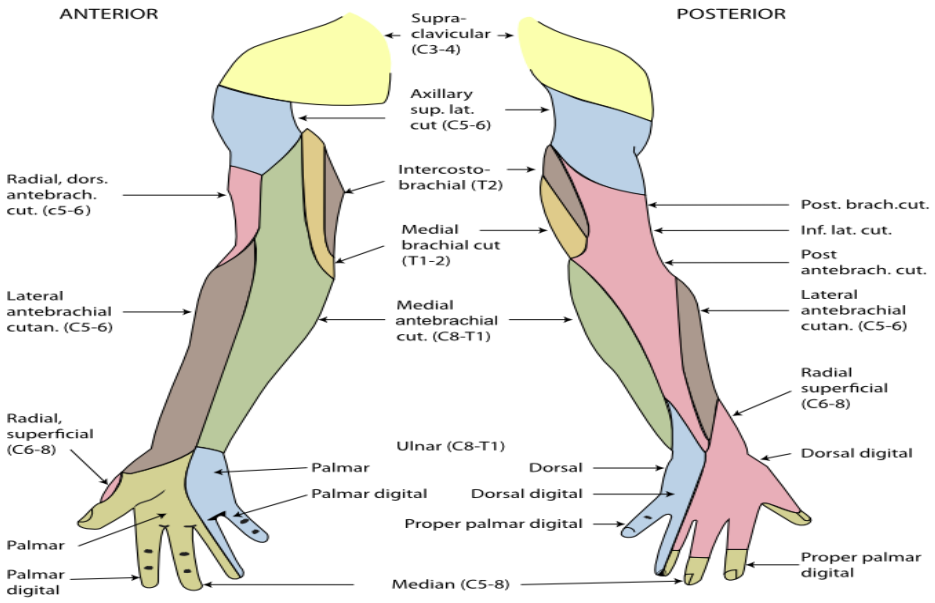

Figure 7: Distribution of interscalene block includes numbness to the shoulder, clavicle and radial aspect of the arm and hand. The patient may have sensation to the ulnar aspect of the hand and arm (Fischer, 2003). Diagram by Henry Vandyke Carter - Henry Gray (1918) Anatomy of the Human Body. Retrieved from: https://commons.wikimedia.org/w/index.php?curid=3460423

b). Supraclavicular/Subclavian

This block is indicated for elbow, forearm, wrist, and hand surgery (NYSORA, 2013). Example: to repair fractured radius/ulna.

This approach gives the most comprehensive block to the upper limb below the shoulder joint. Numbness should be expected to the shoulder, lateral aspect of upper arm, and entire lower arm and hand. The patient may have sensation the medial aspect of the upper arm (Fischer, 2003).

Possible complications associated with this specific approach include pneumothorax (symptoms may be delayed), hemothorax, Horner's Syndrome, and phrenic nerve block (Fischer, 2003).

- Pneumothorax - may occur from inadvertent pleural puncture (Morgan et al., 2002).
- Hemothorax – may occur from inadvertent pleural puncture (Fischer, 2003).
- Horner's Syndrome may occur due to a sympathetic nerve block during placement – patients may experience facial flushing, drooping eyelid, bloodshot

conjunctiva, and pupil constriction on the side of the block (Mele et al., 2015; Morgan et al., 2002).

- Phrenic nerve block – patients with this type of block may experience paralysis of the diaphragm on the side that is blocked (Fischer, 2003). Patients may experience dyspnea (Morgan, Mikhail, & Murray, 2002). This is usually well tolerated in patients without significant chronic respiratory disease, such as COPD (Fischer, 2003).

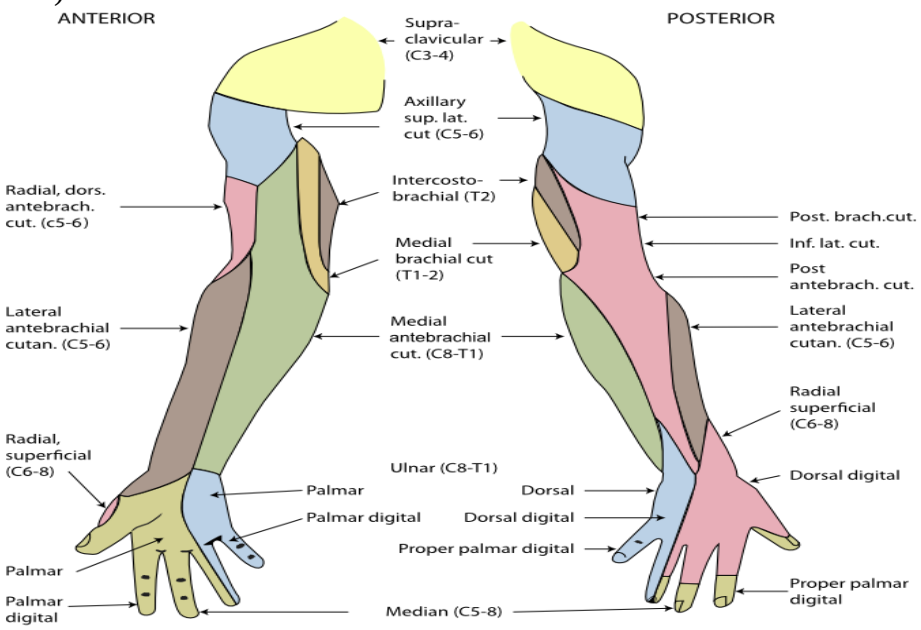

Figure 8: Distribution of subclavian perivascular block includes numbness to the shoulder, lateral aspect of upper arm, and entire lower arm and hand. The patient may have sensation the medial aspect of the upper arm (Fischer, 2003). Diagram by Henry Vandyke Carter - Henry Gray (1918) Anatomy of the Human Body. Retrieved from: https://commons.wikimedia.org/w/index.php?curid=3460423

c). Axillary

This block is indicated for surgery of the hand and forearm (Fischer, 2003).

In this approach, the musculocutaneous and axillary nerves remain unblocked in up to 25% of patients. The radial nerve is also sometimes missed in this block (Fischer, 2003). Numbness should be expected to the medial aspects of the upper and lower arm and hand. The patient may have sensation to the shoulder and the lateral aspects of the hand and arm.

This approach has fewer serious side effects. Possible complications associated with this specific approach include intravascular injection and haematoma. If a vessel is punctured, pressure must be held for 5 minutes as to prevent haematoma (Fischer, 2003).

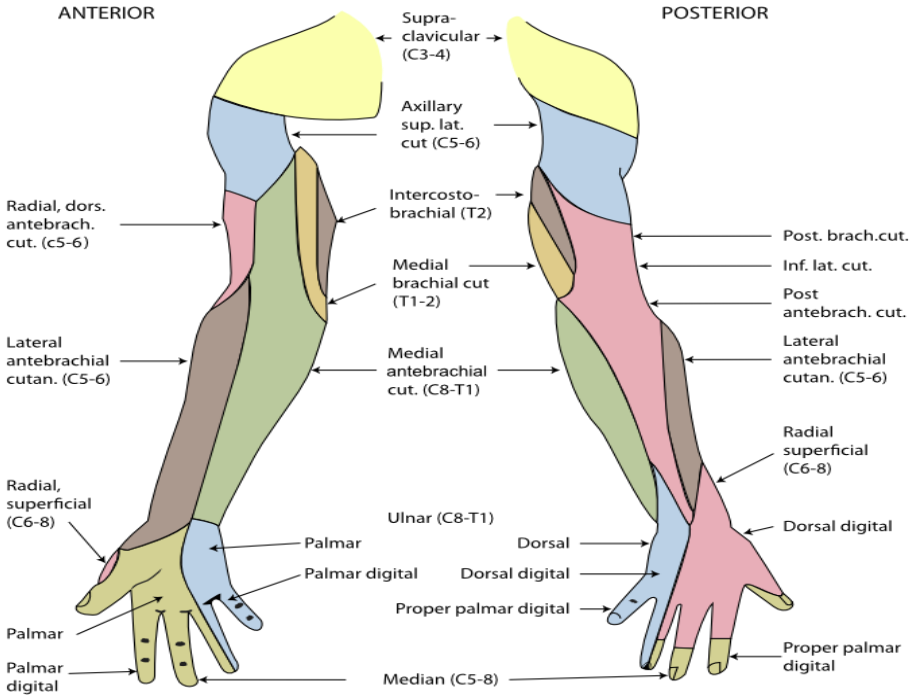

Figure 9: Distribution of axillary block includes numbness to the medial aspects of the upper and lower arm and hand. The patient may have sensation to the shoulder and the lateral aspects of the hand and arm (Fischer, 2003). Diagram by Henry Vandyke Carter - Henry Gray (1918) Anatomy of the Human Body. Retrieved from: https://commons.wikimedia.org/w/index.php?curid=3460423

d). Infraclavicular

This block is indicated for surgery of the hand, wrist, elbow, and forearm (NYSORA, 2013).

This approach requires the use of a peripheral nerve stimulator. A peripheral nerve stimulator is a device that uses a low intensity electrical stimulus to locate a nerve or nerve plexus by causing the muscle to twitch (NYSORA, 2013). The axillary nerve is missed in this block (Fischer, 2003). Numbness should be expected from middle of upper arm to fingertips.

The possible complications associated with this specific approach include pneumothorax, hemothorax, and chylothorax (type of pleural effusion in which lymph produced in the digestive system, known as chyle, accumulates in the pleural cavity). These complications may arise due to complications such as inadvertent placement of the nerve block (Morgan, Mikhail, & Murray, 2002).

4.2 Lower extremity block

Lumbar Plexus Block

a). Psoas Compartment Block

This block is indicated for surgery of the hip and lower limb (Example: femoral neck surgery) (Macrae & Coventry, 2003).

This block is completed at L4-L5 of the lumbar spine and block effects extend to level of S1. Local anaesthetic injected into the psoas sheath provides a block to the femoral, lateral cutaneous, and obturator nerves. This block is sometimes combined with sciatic nerve block (Macrae & Coventry, 2003).

Nurses should expect a decrease in sensation to lateral aspect of upper leg and buttocks and to lower leg and foot (L4-S1). Decreased motor control of the blocked hip and leg should also be expected. The patient will likely require assistance with ambulation.

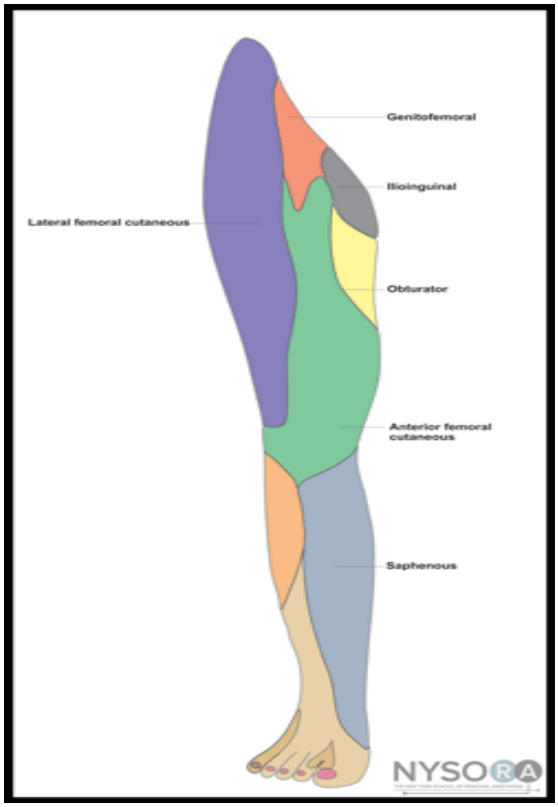

Figure 10: Distribution of lumbar plexus block. Retrieved from: http://www.nysora.com/techniques/neuraxial-and-perineuraxial-techniques/ultrasound-guided/3279-lumbar-plexus-block.html

Nerve Block at the Hip

b). Femoral Nerve Block

This block is indicated for surgery of the upper and lower leg, the knee, and the foot (Example: orthopaedic repair of a fracture of the femoral shaft) (Macrae & Coventry, 2003).

This approach may be combined with a block to the lateral cutaneous and obturator nerves. The femoral nerve affects the quadriceps muscle resulting in quadriceps weakness to the blocked side (Macrae & Coventry, 2003).

Nurses should expect a decrease in sensation to the anterior thigh, knee, and medial aspect of lower leg and foot. The patient should still expect to experience posterior knee pain if the sciatic nerve remains unblocked (Macrae & Coventry, 2003). Nurses should expect the patient to experience quadriceps weakness and as such, the patient will likely require assistance with ambulation.

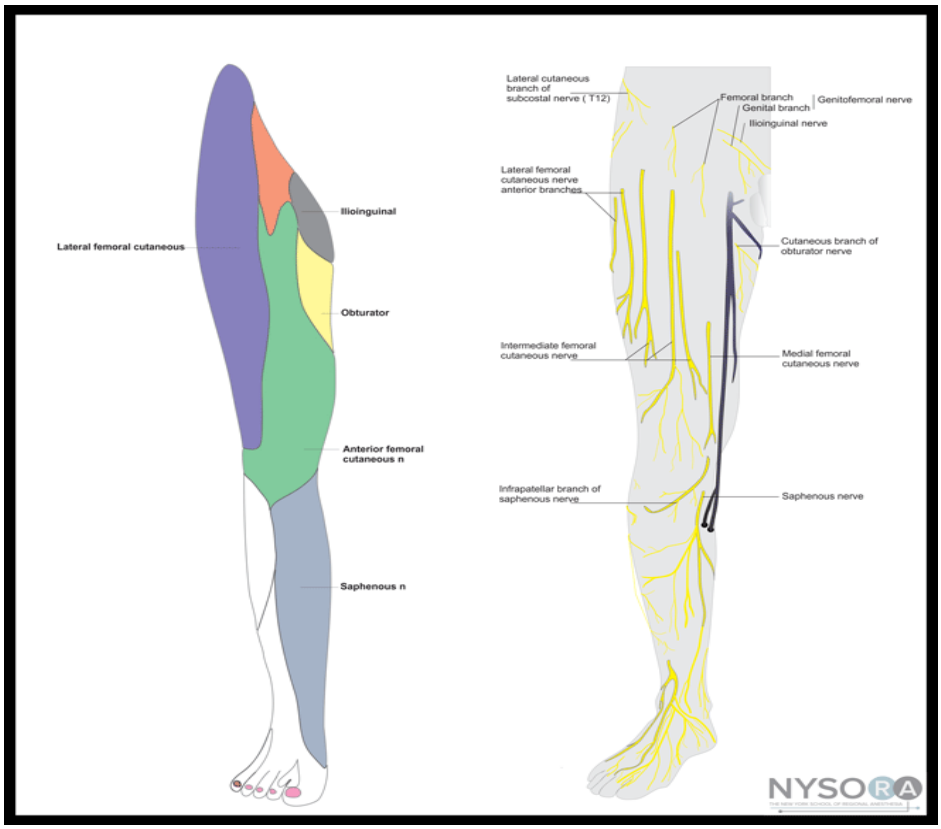

Figure 11: Distribution of the femoral nerve block. Retrieved from: http://www.nysora.com/techniques/nerve-stimulator-and-surface-based-ra-techniques/lower-extremitya/3267-femoral-nerve-block.html

c). Sciatic Nerve Block

This block is indicated for surgery of the lower leg and foot (Macrae & Coventry, 2003).

This block is often performed in combination with femoral nerve block to provide comprehensive anaesthesia of leg (Macrae & Coventry, 2003).

One should expect a decrease in sensation to the back of the thigh, the lateral aspect of the leg and foot. The nurse should expect weakness to the hamstring, and to lower leg muscles. The patient will likely require assistance with ambulation after receiving this block.

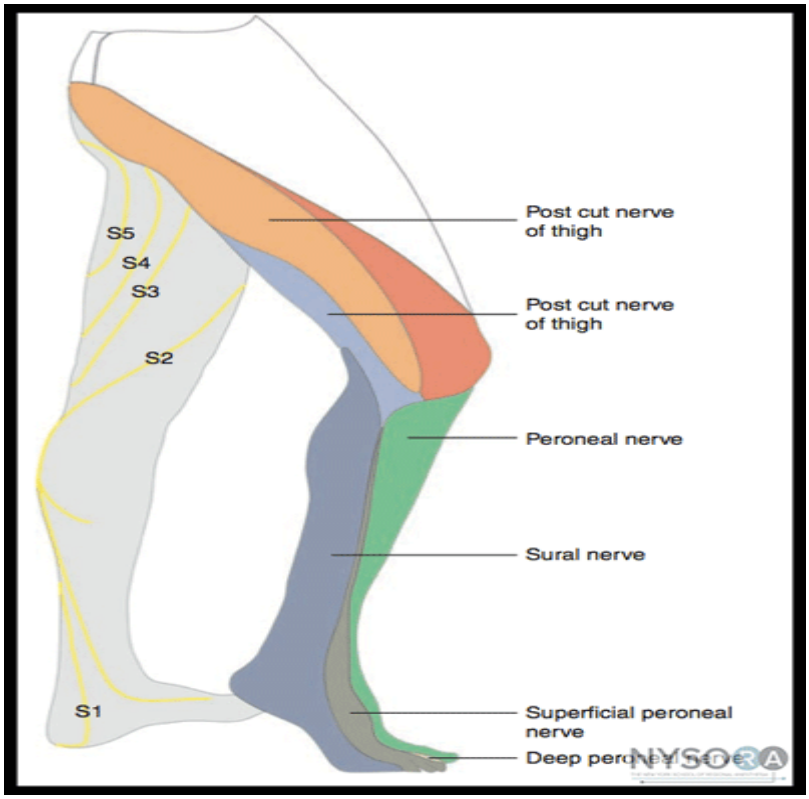

Figure 12: Distribution of sciatic nerve block. Retrieved from: http://www.nysora.com/techniques/nerve-stimulator-and-surface-based-ra-techniques/lower-extremitya/3265-transgluteal-anterior-approach.html

Nerve Block at the Knee

d). Popliteal Block

This block is indicated for surgery of the ankle and foot (Macrae & Coventry, 2003).

This is a sciatic nerve block performed at the popliteal fossa (Macrae & Coventry, 2003).

Nurses should expect a decrease in sensation to the posterior knee and foot, as well as a decrease in motor control to the affected foot.

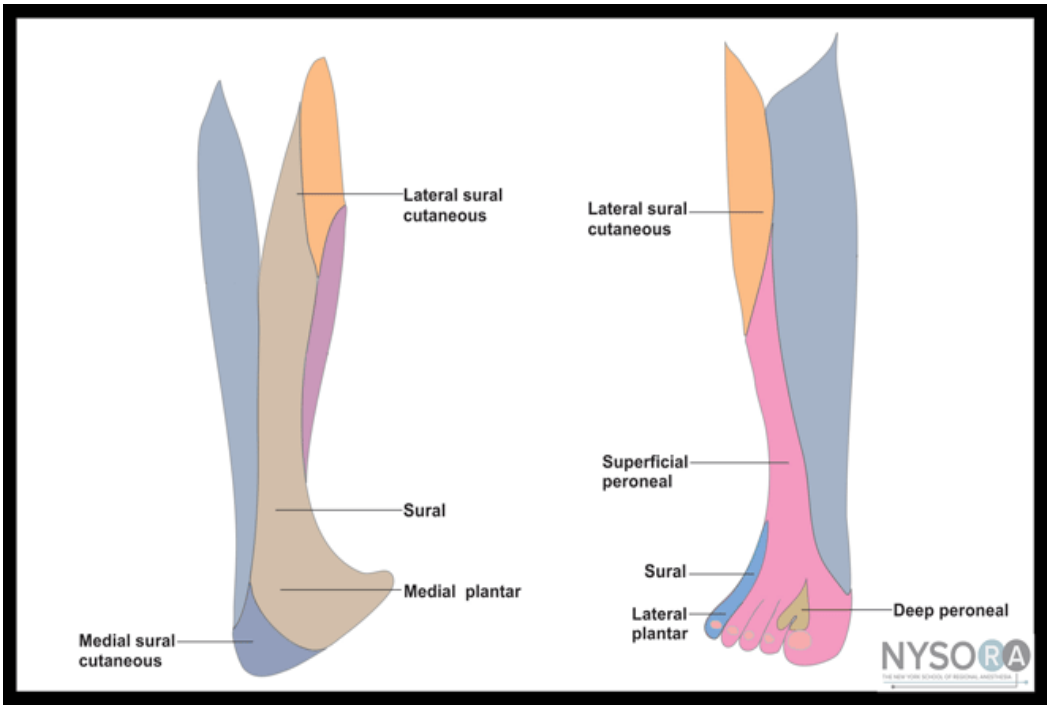

Figure 13: Distribution of popliteal sciatic block. All shaded areas except medial aspect of the leg (blue, saphenous nerve) are anaesthetized with the popliteal block. Retrieved from: http://www.nysora.com/techniques/nerve-stimulator-and-surface-based-ra-techniques/lower-extremitya/3264-transgluteal-approach.html

e). Adductor Canal Block

This block is indicated for surgery of the knee, lower leg, and foot (Macrae & Coventry, 2003). Example: total knee arthroplasty.

The adductor canal block is a block of the femoral nerve that takes place at a more distal level. It does not block the part of the nerve that innervates the quadriceps, improving early ambulation (Macrae & Coventry, 2003).

4.3 Blocks of the Trunk

a). Paravertebral Block

This block is indicated for thoracic and abdominal surgery (Example: thoracotomy, open cholecystectomy, nephrectomy, breast surgery, and inguinal hernia repair) (Lee, 2003).

The paravertebral space is a triangular area that is located adjacent to the spine and found between the ribs (Lee, 2003). It is bordered between the parietal pleura, superior costo-transverse ligament and the posterior intercostal membrane. This approach blocks the sympathetic chain and the rami communicantes (a communicantes is a nerve which connects two other nerves) (Lee, 2003).

This approach is beneficial in that it provides unilateral targeted analgesia that has a decreased risk of hypotension and urinary retention than epidural analgesia (Lee, 2003).

The possible complications associated with this specific approach include hypotension, bilateral block (may result in hemodynamic compromise), pneumothorax, and complete spinal block (Lee, 2003).

5. Medication Information

Local anaesthetics bind to sodium channels in the nerve and block conduction of nerve impulses to the brain that identify as pain. The order of loss of nerve function is: (1) pain, (2) temperature, (3) touch, (4) proprioception (pressure), and (5) skeletal muscle tone. Nerve function returns in the opposite path (Gadsden, 2013).

Local Anaesthetic Medication used in Nerve Blocks

Medication	Indication	Dose	Onset	Duration
Ropivacaine (Naropin)	Pain relief	0.2%	15-30 minutes (Jeng & Rosenblatt, 2016)	5-12 hours (Jeng & Rosenblatt, 2016)
Bupivacaine (Marcaine, Sensorcaine)	Pain relief	0.1%	30-45 minutes (Compendium of Pharmaceuticals and Specialities, 2008)	3-6 hours (Compendium of Pharmaceuticals and Specialities, 2008)
Lidocaine (Xylocaine)	Pain relief	2%	10-20 minutes (Jeng & Rosenblatt, 2016)	3-8 hours (Jeng & Rosenblatt, 2016)

***The onset and duration of the medication will depend on the volume of the medication and site that is used by the anaesthesiologist when placing the block (Jeng & Rosenblatt, 2016).

6. Benefits of Continuous Peripheral Nerve Blocks

- Earlier discharge from Post-Anaesthetic Care Unit (Recovery Room).
- The patient will receive site specific analgesia (ie. the area that receives the nerve block is the area where the surgical procedure is completed) (Layzell, 2013; Richman, et al., 2006; Turjanica, 2007).
- CPNBs promote patient recovery by controlling pain, thus allowing the patient to ambulate and meet postsurgical goals quicker (ex: deep breathing and coughing, complete physiotherapy exercises) (Finn et al, 2016; Hebl, 2008; MacLellan, 2004). It is important to note that patients with lower limb blocks may need assistance with ambulation.
- CPNBs aid in decreasing length of stay of surgical patients by offering pain management and allowing patients to meet postsurgical goals quicker (ex: deep breathing and coughing, early ambulation, participation in physiotherapy exercises) (Finn et al, 2016; Hebl, 2008; MacLellan, 2004; Turjanica, 2007).
- CPNBs aid in earlier ambulation via good pain management (Andreson, et al., 2014; Layzell, 2013; Turjanica, 2007).
- CPNBs support opioid sparing. This results in decreased incidence of nausea/vomiting and pruritus (Andreson, et al., 2014; Richman, et al., 2006; Turjanica, 2007).
- CPNBs help to decrease post-operative complications (atelectasis, deep vein thrombosis) (Duzel, et al., 2013; Sloman, et al., 2005; Turjanica, 2007).

7. Potential Complications

1) **Infection**

The CPNB catheter insertion site should be monitored for signs and symptoms of infection (Le-Wendling & Enneking, 2008; Turjanica, 2007). Signs and symptoms of infection include fever, redness, soreness, swelling, purulent, or foul-smelling drainage at the insertion site (Black, 2005).

- Notify APS for suspected infection.

2) **Hematoma**

The CPNB catheter insertion site should be monitored for signs and symptoms of hematoma (Le-Wendling & Enneking, 2008; Turjanica, 2007). A hematoma is a localized collection of blood trapped in the skin tissue. The blood clots within the tissue, making it hardened on palpation and tender for the patient. It is the result of damage to the blood vessels upon insertion of removal of the nerve block catheter. Signs and symptoms of a hematoma include swelling, tenderness, and redness at the insertion site (Anderson, Anderson, & Glanze, 1998).

- Notify APS for suspected hematoma.

3) **Nerve Injury**

Nerve injury can be caused by trauma to the nerve during needle insertion of the nerve block. It can also occur by unintended injection of medication into the nerve itself (Turjanica, 2007). Signs and symptoms include persistent sensory/motor deficit after the block has worn off.

- Notify APS is sensory or motor deficits continue after the block is worn off.

4) **Pneumothorax** (complication of upper extremity blocks and blocks of the truck only)

Pneumothorax may occur secondary to inadvertent puncture of the plural cavity during needle insertion. Signs and symptoms include chest pain, shortness of breath, and decreased breath sounds on affected side (Fischer, 2003).

- Contact APS immediately and provide appropriate nursing intervention for pneumothorax.

5) Damage to the blocked area

Trauma to the blocked area may occur as the patient's sensation is affected (Turjanica, 2007). The patient may not feel pain, heat, or cold. Care must be taken to protect the blocked area from pressure, and to avoid extreme heat or cold.

6) Local anaesthetic toxicity

Local anaesthetic toxicity is the result of concentration of local anaesthetic reaching toxic levels in the blood. This can occur gradually as local anaesthetics are infused over a several days. This can also occur due to inadvertent intravascular injection of the local anaesthetic (either by direct injection or migration of the nerve catheter) (Le-Wendling & Enneking, 2008; Turjanica, 2007).

Early signs and symptoms of local anaesthetic toxicity include:

- Metallic taste in mouth
- Blurred vision
- Decreased hearing
- Tremors
- Dizziness
- Tinnitus
- Numbness/tingling around the lips
- Slurred speech

(Sheppard & Fulford, 2015)

Late signs and symptoms of local anaesthetic toxicity include:

- Decrease in cardiac conduction
- Bradycardia/tachycardia
- Ventricular fibrillation
- Hypotension
- Arrhythmia
- Seizures
- Cardiac arrest

(Sheppard & Fulford, 2015)

- ***Stop CPNB infusion and contact APS immediately. Provide appropriate nursing interventions.***

8. Nursing Assessment and Management

The patient receiving a CPNB is to be assessed based on Eastern Health Policy *(Continuous Peripheral Nerve Block (Adult – Acute Care) PRC – 025)* as outlined below:

- Pump settings are verified upon receiving the patient in your care. Infusion rate is to be verified and documented every hour in the *Continuous Peripheral Nerve Block Flow Sheet.* Pump settings should be check every 12 hours.
  Document on Continuous Peripheral Nerve Block Flow Sheet.
  Registered nurses can adjust, stop, and restart CPNB infusion with an order from the anaesthesiologist (Sheppard & Fulford, 2015).
  The nurse should be aware of the type of medication that is used for the block, the type of block provided, the side effects of the block, and the possible complications associated with nerve blocks.

- The CPNB catheter site and dressing is to be assessed every 12 hours.
  - If the catheter tubing breaks or is disconnected from blue hub, cover catheter end with a sterile dressing, contact APS, and keep catheter for APS inspection.
  - If the catheter is displaced/has migrated, stop CPNB infusion, contact APS, and keep catheter for inspection.
  - If the CPNB catheter site is exposed, cover site with a sterile, transparent dressing and contact APS (Sheppard & Fulford, 2015).

  Document on Continuous Peripheral Nerve Block Flow Sheet.

- Motor function is to be assessed using Bromage Scale (Appendix B):
  - Every 4 hours for 24 hours then,
  - Every 8 hours until infusion is complete then,
  - Six hours after infusion complete (Sheppard & Fulford, 2015).

  Document on Continuous Peripheral Nerve Block Flow Sheet. Contact APS if there are significant changes in motor function or if motor impairment persists after the block has worn off.
  The nurse should be aware of the type of block provided and its expected effect on motor function. Be prepared to provide assistance with ambulation.

- Sensation to dermatomes is to be assessed using response to cold stimuli (see Dermatomes Chart in Appendix A):
  - Every 4 hours for 24 hours then,
  - Every 8 hours until infusion is complete then,
  - Six hours after infusion complete (Sheppard & Fulford, 2015).

  Document on Continuous Peripheral Nerve Block Flow Sheet. Contact APS if there are significant changes in sensation or if sensory impairment persists after the block has worn off.

Do not use hot or cold pack on the patients receiving CPNB as their sensation is decreased. Prolonged exposure to extreme temperatures may result in tissue injury. This is not the same as assessing the patient's sensation with ice or cold stimuli as stated above.

- Pain (at rest and with activity) is to be assessed every 4 hours using the Pain Rating Scale (Sheppard & Fulford, 2015).
  Document on Continuous Peripheral Nerve Block Flow Sheet. Contact APS if the patient experiences significant increases in pain levels.

- Signs and symptoms of Local Anaesthetic Toxicity is to be assessed every 4 hours (Sheppard & Fulford, 2015). ***Document on Continuous Peripheral Nerve Block Flow Sheet. Contact APS if the patient is exhibiting signs of local anaesthetic toxicity.***

  Supplemental opioids, central nervous system depressants, non-steroidal anti-inflammatory drugs (NSAIDs), anticoagulants, and anti-platelets (with the exception of subcutaneous heparin) need to be approved by Anaesthesiology while the patient is on CPNB protocol (Sheppard & Fulford, 2015).
  Adjunct medications may be ordered as a form of multimodal analgesia for pain management. The nerve block will only provide pain relief in the area of the blocked nerve. Patients may require additional analgesia for breakthrough pain to achieve effective pain relief.

- Anticoagulants or anti-platelets may be ordered to be held for a specific period of time after nerve block removal (Sheppard & Fulford, 2015).

- Ensure resuscitative equipment and medication is available in the care area, and that oxygen and suction equipment are available at the patient's bedside. The patient must have intravenous access while on CPNB protocol (Sheppard & Fulford, 2015).

- Registered Nurses can change a commercially prepared infusion bag for CPNBs. An independent double check must be performed in doing so (Sheppard & Fulford, 2015).

9. Patient Education

The nurse should educate the patient regarding sensation and movement. Nerve blocks affect the motor ability and sensation of the area that it targets for pain relief. Patients need to be aware that motor ability will return before sensation, therefore the patient will be able to move before they can feel though they still may experience weakness (Grevstad, Mathiesen, Lind, & Dahl, 2014; Guarin, 2013; McCamant, 2006; McGraw & Ilfeld, 2012; Turjanica, 2007).

Blocks of the lower limb cause motor impairment in the area of the spinal nerve that is blocked. The nurse should educate patients on the area of expected motor impairment and of their increased risk of falls (for lower limb blocks) (Chelly et al., 2010; Foisy, 2013). Patient teaching is required on the expectation of aid for ambulation (Foisy, 2013).

Blocks of the upper limb cause motor impairment in the area of the spinal nerve that is blocked. Patients need to be educated on the area of expected motor impairment. These patients may require a sling for support of the limb.

Nurses should educate the patient of the importance of protecting skin from extreme heat or cold as they may not feel the effects due to changes in sensation. For the same reason, patients should also be advised not to scratch or rub the area (Guarin, 2013, McCamant, 2006).

Nurses should provide instruction to patients and their families on the significant side effects to watch for relating to toxicity. It is important that patients and their families report the occurrence of any side effects to a health care provider immediately (Guarin, 2013; Turjanica, 2007).

The nurse should educate patients and their families the on the importance of good pain management and its significance in recovery. Adjunct medications may be ordered as a form of multimodal analgesia for pain management. The nerve block will only provide pain relief in the area of the blocked nerve and patients may require additional analgesia for breakthrough pain, especially as the block wears off (Jeng & Rosenblatt, 2016). Encourage patients to be active members in their pain management goals.

The nurse should educate the patient and their families on the benefits of non-pharmacologic interventions that can be used to assist with pain management. Some of these include:

- Massage – a back rub or foot rub may be relaxing and aid in blocking pain. This may help patients sleep (Sikorski & Barker, 2005).
- Cold applications (on areas that do not have sensation loss) – cold packs used in intervals help reduce pain and provide relief to the affected area. It does so by reducing edema and inflammation (McCaffery & Pasero, 1999; Sikorski & Barker, 2005).

- Music – music can be used as a distraction technique. It provides the patient with a new focus thereby contributing to pain reduction and relief (McCaffery & Pasero, 1999; Sikorski & Barker, 2005).
- Guided Imagery – guided imagery is when a patient is coached to visualize a pleasurable scene/experience. The sensory aspects of the scene are a large focus. This is a distraction technique (Sikorski & Barker, 2005).
- Distraction – there are many forms of distraction that can be discussed with the patient. Praying (if selected by the patient) and reading are often helpful forms of distraction that can aid in pain reduction by relaxing the patient (McCaffery & Pasero, 1999).
- Rhythmic Breathing – This method of breathing is a form of distraction. It forces attention away from the pain as patients focus on the breathing and rhythm (McCaffery & Pasero, 1999; Sikorski & Barker, 2005).
- Humour – humour is thought to provide pain relief as it increases the patient's endorphins (Sikorski & Barker, 2005).

10. Acute Pain Service Role

The Acute Pain Service will:

- Complete daily assessment (and PRN) of the patient receiving a peripheral nerve block.
- Order/approve all analgesia while the patient is on CPNB protocol.
- Assess medications, home pain medications, and make changes medication regimes based on the clinical picture.
- Provide a support and education, as required, to RN's caring for patients receiving continuous peripheral nerve blocks for pain management.

ONLY the Anaesthesiologist or the Clinical Nurse Specialist for the Acute Pain Service can:

- Start CPNB infusions.
- Administer bolus doses through the peripheral nerve block catheter.
- Change the CPNB tubing.
- Disconnect the CPNB tubing.
- Change the peripheral nerve block dressing.
- Convert a CPNB from a continuous infusion to an intermittent catheter by capping the catheter.
- The Clinical Nurse Specialist for the Acute Pain Service can remove a peripheral nerve block catheter (with an order from an Anaesthesiologist)
  (Sheppard & Fulford, 2015)

**** Helpful resources with additional information on PNBs can be found at:**

- ✓ **Eastern Heath's Intranet site link: UpToDate (**www.uptodate.com**)**
- ✓ **The New York School of Regional Anaesthesia (NYSORA) (**http://www.nysora.com/**)**

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Appendix A3

Test Your Knowledge!

Multiple Choice: Please circle the correct response

1. A patient's pain level is:
    a) What the surgeon says it is
    b) What the anesthesiologist says it is
    c) What the patient says it is
    d) What the nurse says it is

2. The peripheral nervous system has ____ pairs of spinal nerves?
    a) 12
    b) 24
    c) 31
    d) 42

3. The brachial plexus is located in the _____.
    a) Neck
    b) Shoulder
    c) Back, near the psoas muscle
    d) Pelvic cavity

4. The cervical plexus is located in the _____.
    a) Neck
    b) Shoulder
    c) Back, near the psoas muscle
    d) Pelvic cavity

5. The dorsal root allows passage of _____ information.
    a) Sensory
    b) Motor

6. The level of sensation felt by a patient after receiving a peripheral nerve block can be assessed using _____.
    a) Dermatomes
    b) Myotomes

7. This type of upper limb block is associated with voice hoarseness due to the vocal cords being affected by the block:
    a) Interscalene
    b) Supraclavicular
    c) Axillary
    d) Infraclavicular

8. This type of lower limb block is associated with quadriceps weakness:
    a) Paravertebral block
    b) Sciatic block
    c) Femoral block
    d) Popliteal block

9. This type of nerve block is indicated for surgery to the thoracic or abdominal region:
    a) Paravertebral block
    b) Sciatic block
    c) Femoral block
    d) Popliteal block

10. The type of medication used in peripheral nerve block continuous infusions is:
    a) Narcotic
    b) Local anesthetic

11. When a patient receives a local anesthetic medication in their peripheral nerve block, what sensation do they lose first?
    a) Temperature
    b) Motor
    c) Pain
    d) Touch

12. Which is not a benefit of the peripheral nerve block?
    a) Decreased incidence of postoperative complications (atelectasis, DVT, etc.)
    b) Early ambulation after surgery
    c) Decreased incidence of postoperative nausea/vomiting and pruritus
    d) Increased motor weakness in the blocked limb

13. Some of the potential complications of peripheral nerve blocks include:
    a) Infection
    b) Hematoma
    c) Nerve injury
    d) Pneumothorax
    e) All of the above
    f) A & C
    g) B & D

14. A patient receiving a CPNB reports there is a metallic taste in his mouth, numbness and tingling around his lips, and that he has ringing in his ears. What action should you take?
    a) Increase CPNB infusion, chart action.
    b) Decrease CPNB infusion, chart action
    c) Stop CPNB infusion immediately, notify APS during morning APS rounds
    d) Stop CPNB infusion immediately, notify APS immediately

15. If the CPNB catheter becomes disconnected, you should:
    a) Cover with a sterile dressing, notify APS immediately
    b) Leave catheter as found, notify APS immediately
    c) Cover with a sterile dressing, notify APS during morning APS rounds

16. Sensation to dermatomes should be assessed using:
    a) Cold stimuli, like ice
    b) Warm stimuli, like a heat pack

17. Pain is to be assessed every ____ hours in a patient receiving a CPNB infusion, as per Eastern Health Policy:
    a) 2
    b) 4
    c) 6
    d) 8

True or False: Please circle the correct response

18. **True or False** Only the anesthesiologist or Clinical Nurse Specialist with the Acute Pain Service can administer bolus doses of medication through the peripheral nerve catheter.

19. **True or False** Only the anesthesiologist or Clinical Nurse Specialist with the Acute Pain Service can convert a peripheral nerve catheter from a continuous infusion to an intermittent catheter by capping the catheter.

20. **True or False** Only the anesthesiologist or Clinical Nurse Specialist with the Acute Pain Service can remove a peripheral nerve catheter.

21. **True or False** Only the anesthesiologist or Clinical Nurse Specialist with the Acute Pain Service can change a commercially prepared infusion bag when the volume is low.

22. **True or False** Anticoagulants **do not** need to be approved by an anesthesiologist while the patient is on CPNB protocol.

23. **True or False** A patient who has a CPNB infusion **cannot** have any additional pain medication.

24. **True or False** A popliteal block is an upper limb block that is indicated for surgery of the hand, wrist, elbow, or forearm.

25. **True or False** An axillary block is an upper limb block that is indicated for surgery of the hand or forearm.

26. **True or False** A supraclavicular block is a block of the trunk. Expect numbness of the shoulder, lateral aspect of the upper arm, and entire lower arm and hand.

27. **True or False** The principle objective of pain management is to keep pain at a tolerable level.

28. **True or False** The patient's self-report of pain is considered to be the most reliable and accurate measure of pain.

29. **True or False** You should **not** use heat packs or ice packs on a blocked limb.

Please circle the correct response

30. Celebrex (NSAID) **does** / **does not** need to be approved by an anesthesiologist while a patient is receiving a CPNB.

31. Metoprolol (beta-blocker) **does** / **does not** need to be approved by an anesthesiologist while a patient is receiving a CPNB.

32. Morphine (opioid) **does** / **does not** need to be approved by an anesthesiologist while a patient is receiving a CPNB.

33. Ranitidine (histamine 2 blocker) **does** / **does not** need to be approved by an anesthesiologist while a patient is receiving a CPNB.

34. An anesthesiologist prepares a medication bag for a CPNB infusion by mixing it herself and asks the nurse to hang up the bag when the infusion runs low. The nurse **is** / **is not** permitted to hang a non-commercially prepared bag that is mixed by someone else.

Answer Key:

1. C

   A patient's pain level is what the patient says it is.

2. C

   The peripheral nervous system has 31 pairs of spinal nerves?

3. B

   The brachial plexus is located in the shoulder.

4. A

   The cervical plexus is located in the neck.

5. A

   The dorsal root allows passage of sensory information.

6. A

   A dermatome is the section of the skin that is innervated by particular spinal nerves. Level of sensation can be assessed using dermatomes.

7. A

   The interscalene block affects the laryngeal nerve causing voice hoarseness due to affected vocal cords on the side that is blocked.

8. C

   The femoral nerve affects the quadriceps muscle resulting in quadriceps weakness to the blocked side.

9. A

   This block is indicated for thoracic and abdominal surgery (thoracotomy, open cholecystectomy, nephrectomy, breast surgery, and inguinal hernia repair).

10. B

    Local anesthetic is used in CPNB infusions.

11. C

The order of loss of nerve function is: (1) pain, (2) temperature, (3) touch, (4) proprioception, and (5) skeletal muscle tone. Nerve function returns in the opposite path.

12. D

Motor block is not a benefit of the peripheral nerve block.

13. E

Some of the potential complications of peripheral nerve blocks include infection, hematoma, nerve injury, pneumothorax, local anesthetic toxicity, and damage to the blocked area.

14. D

Stop CPNB infusion if patient is experiencing symptoms of local anesthetic toxicity and contact APS immediately. Provide appropriate nursing interventions.

15. A

If the catheter tubing breaks or is disconnected from blue hub, cover catheter end with a sterile dressing, contact APS, and keep catheter for APS inspection.

16. A

Sensation to dermatomes is to be assessed using response to cold stimuli.

17. B

Pain (at rest and with activity) is to be assessed every 4 hours using the Pain Rating Scale.

18. True

19. True

20. True

21. False

Registered Nurses can change a commercially prepared infusion bag for CPNBs. An independent double check must be performed in doing so.

22. False

Supplemental opioids, central nervous system depressants, non-steroidal anti-inflammatory drugs (NSAIDs), anticoagulants, and anti-platelets (with the exception of subcutaneous heparin) need to be approved by Anesthesiology while the patient is on CPNB protocol.

23. False

Adjunct medications may be ordered as a form of multimodal analgesia for pain management. The nerve block will only provide pain relief in the area of the blocked nerve and patients may require additional analgesia for breakthrough pain, especially as the block wears off. Encourage patients to be active members in their pain management goals.

24. False

A popliteal is a lower limb block that is indicated for surgery of the ankle and foot.

25. True

26. False

A supraclavicular block is an upper limb block that is indicated for shoulder, elbow, forearm, wrist, and hand surgery.

27. True

28. True

29. True

30. Does

Supplemental opioids, central nervous system depressants, non-steroidal anti-inflammatory drugs (NSAIDs), anticoagulants, and anti-platelets (with the exception of subcutaneous heparin) need to be approved by the anesthesiologist while the patient is on CPNB protocol.

31. Does not

32. Does

Supplemental opioids, central nervous system depressants, non-steroidal anti-inflammatory drugs (NSAIDs), anticoagulants, and anti-platelets (with the exception of subcutaneous heparin) need to be approved by the anesthesiologist while the patient is on CPNB protocol.

33. Does not

34. Is not

Registered Nurses can change a commercially prepared infusion bag for CPNBs.