NURSING STUDENTS’ KNOWLEDGE AND ATTITUDES ABOUT PAIN

by

Jennifer Whitney Hroch

A thesis submitted to the School of Nursing
In conformity with the requirements for
the degree of Master of Nursing Science

Queen’s University
Kingston, Ontario, Canada
(January, 2017)

Copyright ©JenniferWhitneyHroch, 2017
Abstract

**Introduction and Purpose:** Poorly managed or unmanaged pain is a problem that affects individuals, entire healthcare systems and societies throughout the world. Although national and international practice guidelines exist for the management of both acute and chronic pain, it remains problematic. Nurses are key contributors to interprofessional pain management teams, and are involved in both the assessment and management of pain. It is important to understand pain knowledge and attitudes amongst nursing students before they enter independent practice. The purpose of this study was to examine final year, pre-registration nursing students’ knowledge and attitudes about the assessment, treatment and management of pain.

**Methods:** Using a cross-sectional, descriptive design, 336 final year Bachelor of Science in Nursing (BScN) and Practical Nursing (PN) students were recruited through convenience sampling to complete the Knowledge and Attitudes Survey Regarding Pain (KASRP). The KASRP score is calculated by percentage score and 80% or higher is considered a passing score, which indicates adequate knowledge and attitudes towards pain.

**Results:** The mean KASRP score (SD) was 66.7% (9.1). English as participants’ primary language, attending School A, and having prior experience caring for someone in pain were independently associated with a statistically significant increase in mean KASRP scores (p<.05). Major areas of weakness in pain knowledge and attitudes were related to understanding populations at risk of respiratory depression after receiving an opioid, dosage calculations, medication administration and pharmacology. Strengths in
knowledge and attitudes involved determining the best judge of an individual’s pain, the reliability of self-report of pain in children, and symptoms of withdrawal from opioid medications.

**Conclusion:** Further research is needed to understand the provincial and national levels of pain knowledge and attitudes of nursing students in other programs in Ontario and Canada. As well, as a follow up study to examine knowledge and attitudes once students have been in practice to determine if further learning occurs in clinical practice.
Co-Authorship

Dr. Elizabeth VanDenKerkhof
Dr. Mona Sawhney
Dr. Nancy Sears
Laurie Gedke-Kerr
Acknowledgements

I would like to extend my gratitude to a number of people who have helped in the development of this work. I would like to thank Drs. Elizabeth VanDenKerkhof and Mona Sawhney - your unending support throughout this process is appreciated. The extended meetings, constructive feedback, and extra help you provided to me has advanced my understanding of nursing research. I would also like to thank Laurie Gedcke-Kerr and Dr. Nancy Sears for being on my committee and providing valuable feedback during the editing phases of my proposal and thesis- thank you!

I am also grateful to Dr. Richard Henry, for sparking my interest in chronic pain research and giving me the opportunity gain experience in this important area. I also extend my gratitude to Dr. Joel Parlow for allowing me the opportunity to work in pain and anesthesiology research.

To my loving and supportive husband, Jason and my family who have encouraged me through some of the tough times during the last two years and have forgiven me for being a hermit during the process!

Thank you all so much
# Table of Contents

Abstract .............................................................................................................................................. ii
Co-Authorship ..................................................................................................................................... iv
Acknowledgements .......................................................................................................................... v
List of Figures .................................................................................................................................... viii
List of Tables .................................................................................................................................... ix

Chapter 1 Introduction ....................................................................................................................... 1
  Management of Pain ......................................................................................................................... 3
  Study Purpose ................................................................................................................................. 4
  Significance ..................................................................................................................................... 5
  Theoretical Framework .................................................................................................................... 5

Chapter 2 Literature Review .............................................................................................................. 8
  Studies that used the KASRP tool ................................................................................................. 10
  Studies that used one measurement tool, other than the KASRP .................................................. 17
  Studies that used more than one measurement tool ..................................................................... 20
  Case Vignettes .............................................................................................................................. 24
  Semi-Structured Interviews .......................................................................................................... 26
  Unpublished Tools .......................................................................................................................... 28
  Curriculum ...................................................................................................................................... 31
  Summary ......................................................................................................................................... 32

Chapter 3 Methods ........................................................................................................................... 35
  Setting and Sample ......................................................................................................................... 36
  Knowledge and Attitudes Regarding Pain ....................................................................................... 38
  Perceived Adequacy of Pain Education .......................................................................................... 40
  Demographic and Educational Characteristics .............................................................................. 41
  Ethics ............................................................................................................................................... 41
  Data Collection .............................................................................................................................. 42
  Data Management ......................................................................................................................... 43
    Handling of Missing Data ............................................................................................................. 44
  Statistical Analysis .......................................................................................................................... 45
    Demographic Characteristics ....................................................................................................... 45
    Knowledge and Attitudes about Pain ............................................................................................ 45

Chapter 4 Results ............................................................................................................................... 48
Sample and Response Rate..................................................................................................................48
Demographic Characteristics..............................................................................................................49
Knowledge and Attitudes about Pain .................................................................................................52
Strengths and Weaknesses in Pain Knowledge and Attitudes..........................................................61
Chapter 5 Discussion ..........................................................................................................................67
  Discussion of Key Findings ..............................................................................................................67
  Comparison of Key Findings with Current Evidence .................................................................68
  Results in the context of the Critical Thinking Framework ..................................................75
  Strengths and Limitations ..............................................................................................................75
  Clinical and Academic Implications ..........................................................................................77
  Future Research ..............................................................................................................................78
  Conclusion .........................................................................................................................................79
References.............................................................................................................................................82
Appendix A Critical Thinking Framework .......................................................................................94
Appendix B Search Strategy ...............................................................................................................95
Appendix C Literature Review Table ..............................................................................................96
Appendix D Knowledge and Attitudes Survey Regarding Pain ..................................................105
Appendix E Author Permission Letter ..........................................................................................110
Appendix F KASRP Alterations .......................................................................................................111
Appendix G Demographics and Information Sheet ........................................................................112
Appendix H Consent Form ................................................................................................................113
Appendix I Linear Regression Steps ..............................................................................................115
Appendix J Question Chart ................................................................................................................120
Appendix K Residual Plot ..................................................................................................................126
List of Figures

Figure 1 *Histogram showing the distribution of the variable: Age* ...............................................50
Figure 2 *Histogram showing the distribution of KASRP scores* ...............................................53
Figure 3 *Boxplot showing the distribution of KASRP scores* ....................................................54
List of Tables

Table 1 Number and percent of participants who participated in the KASRP by survey distribution site .................................................................................................................................................. 49
Table 2 Demographic characteristics of participants .................................................................................................................................................. 51
Table 3 KASRP scores when missing responses excluded from the analysis versus missing responses coded as an incorrect response .................................................................................................................................................. 53
Table 4 KASRP scores for each site .................................................................................................................................................................................................. 55
Table 5 School and program in relationship to mean KASRP scores (n=336) .................................................................................................................................................. 56
Table 6 Bivariate analysis of independent variables and KASRP scores .................................................................................................................................................. 57
Table 7 Multiple linear regression of independent variables and KASRP scores - final reduced model .................................................................................................................................................. 59
Table 8 Participants’ perception of their preparation in pain and pain management education .................................................................................................................................................. 60
Table 9 KASRP questions identifying major gaps in pain knowledge and attitudes in final year students (≤40% answered correctly) .................................................................................................................................................. 61
Chapter 1

Introduction

Pain is a personal, multi-faceted experience affected by ethnicity, prior pain experiences, opinions, attitude and coping strategies (Schug, Palmer, Scott, Halliwell & Trinca, 2015). Pain is defined as “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, 2011, p. 250). Poorly managed or unmanaged pain is a problem that affects individuals, entire healthcare systems and societies throughout the world (Lynch, 2011). There are treatments available for acute and chronic pain, yet pain is found to be highly prevalent and problematic in healthcare settings (Argoff & Fine, 2010).

An examination of the prevalence of acute pain in hospitalized adult patients, by way of a systematic review, revealed a range of 37.7%-84.0% of patients reporting acute pain (Gregory & McGowan, 2016). In 2003, a telephone survey conducted to study the prevalence of chronic pain in the community in 15 European countries and Israel found that of the 46,394 study participants, 19% reported moderate or severe pain that has lasted at least six months (Breivik, Collett, Ventafridda, Cohen & Gallacher, 2006).

Similar prevalence estimates of acute and chronic pain are reported in Canadian studies. In a prospective study of acute pain in women undergoing gynecologic surgery, moderate to severe postoperative pain was reported in 66% of patients in the post-anesthetic care unit, 26% upon discharge from hospital, and 63% at one week postoperatively (VanDenKerkhof et al., 2012). In a randomized controlled trial
examining the impact of pre-operative pain education given before coronary artery bypass graft surgery, 77% of patients reported moderate to severe pain on post-operative day one, 66% on day two, and 38% on day five (Watt-Watson et al., 2004). The prevalence of chronic pain in Canada is consistent with the results from the European study by Breivik and colleagues (2006). Using data from the Canadian Community Health Survey, the prevalence of chronic pain between 1994 and 2008 (sample sizes ranged from 17,626 to 134,072) was found to be 15.3% to 19.5% (Reitsma, Tranmer, Buchanan & VanDenKerkhof, 2012); the annual incidence was 4.8% to 7.1% for men and 6.0% to 8.7% for women (Reitsma, Tranmer, Buchanan & VanDenKerkhof, 2012). An earlier general population study found chronic pain prevalence to be 49.0% in Southeastern Ontario (Tripp, VanDenKerkhof & McAlister, 2006). Additionally, in a 2011 telephone survey of 2000 Canadians, 18.9% of adults reported chronic pain (Schopflocher, Taenzer & Jovey, 2011).

Chronic and acute pain differ in both mechanism and duration. Acute pain is a behavioral or biochemical cascade initiated by tissue injury (Pergolizzi, Raffa & Taylor, 2014). Acute pain is thought to serve a useful purpose and usually has a duration of three months or less (Grichnik & Ferrante, 1991). Poorly managed acute postoperative pain may decrease participation in rehabilitative exercises such as physiotherapy and deep breathing (Francis & Fitzpatrick, 2013) and can become chronic, however the process of transition from acute to chronic pain is not well understood (Voscopoulos & Lema, 2010). Several factors increase the risk of developing chronic post-surgical pain, including the existence of pain prior to surgery, the nature of the surgery, nerve damage, adjuvant radiation treatment, anxiety and depression (Katz & Selzer, 2009; Kehlet,
Chronic pain is pain that persists past the ‘usual’ healing timeframe, or pain that is present for longer than three months (Cohen, Quinter & Buchanan, 2013). Chronic pain can originate in nerves or from injuries, conditions or diseases which affect the nerves (Scholz, 2014). The most frequently reported causes of chronic pain are various arthritic and inflammatory conditions (31%), low back or spinal conditions (21%), injury and postoperative sequelae (13%), migraines or headaches (11%), neuropathic or neurological problems (11%) and soft tissue pain (8%) (Boulanger, Clark, Squire, Cui & Horbay, 2007). Chronic pain can affect quality of life, be associated with depression and suicide, and affect a person’s ability to perform work duties (Choiniere et al., 2010).

Management of Pain

National and international practice guidelines exist for the management of both acute and chronic pain. Best practice pain management interventions have been defined as including comprehensive pain assessments, and exploring patients’ beliefs, knowledge, and level of understanding about pain and its’ management. Collaborating with patients is essential to identify pain management goals, implement pain management plans, and evaluate pain management efficacy (Registered Nurses Association of Ontario, 2013).

Treating pain involves multidisciplinary, multimodal care. Best practice acute pain management involves medication, physical therapy and psychotherapy as an adjuvant therapy (Gatchel, 2007; National Pain Centre, 2010; Schug, 2015). Chronic pain management best practice is based on a biopsychosocial model of pain (Gatchel et al., 2007). Treatment tends to involve the use of non-opioid and opioid medications, physical
therapy, psychotherapy and alternative or complementary therapies (Chou et al., 2009). Mind-body strategies, sleep remedies, exercise programs, dietary changes and supplements are among some of the recommended healthy living strategies for those who suffer from chronic pain (Pain BC, 2016).

In spite of available guidelines, acute and chronic pain are persistent health issues. This may be due to pain related values and beliefs amongst health care professionals, and/or inadequate levels of pain theory knowledge. These factors in turn may affect pain management decision-making, knowledge translation, use of available evidence, and prioritization of pain assessment and management at individual and institutional levels (Seers, Watt-Watson & Bucknall, 2006). Nurses are contributors to interprofessional pain management teams and are involved in both the assessment and management of pain (Brown, 2013; Courtenay & Carey, 2008; Francis & Fitzpatrick, 2013).

Gaining an understanding of pain knowledge and attitudes amongst nurses is important given the high prevalence of pain in healthcare settings and in the community (Al-Khawaldeh, Al-Hussami & Darawad, 2013). A part of this important initiative is understanding nursing students’ foundational pain management knowledge and attitudes before entering independent practice.

**Study Purpose**

The purpose of this study was to examine final year, pre-registration nursing students’ knowledge and attitudes about the assessment, treatment and management of pain. The results of the proposed study could provide a foundation for considering educational approaches to improve nursing education related to pain care and to improve the care and experiences of patients.
Significance

In 2015, there were 115,385 Registered Nurses, and 45,818 Registered Practical Nurses in Ontario (College of Nurses of Ontario [CNO], 2015). It is during the nursing educational process that nurses acquire foundational knowledge, attitudes and skills that are then translated into nursing practice (Clark, 2004). Students develop attitudes through socialization (Holinger, 1999), and through interactions with other students, patients, and educators (Ferguson & Day, 2005; Gelder, Lopez-Ibor & Andreason, 2003; Liaschenko & Peter, 2004; Lindeman, 2000). It is important to investigate nursing students’ knowledge and attitudes toward pain, as this understanding will illustrate potential gaps and identify areas in need of intervention during the period when knowledge and attitudes are developing.

Theoretical Framework

The theoretical underpinning used for this research study is the Critical Thinking Framework (Edwards, 2007). This framework describes how nurses or nursing students can employ critical thinking while in practice (Appendix A). This framework involves two overlapping phases. Phase 1 examines the potential choices and courses of action that can be taken, and phase 2 is related to taking responsibility for actions associated with the choices in phase 1. The phases are bi-directional indicating that one can move between phases as needed. For example, one can move from phase one to phase two and then if needed, continue to move between the phases dependent on what is required in that particular circumstance. In the current study, this framework was utilized as nurses and nursing students are constantly faced with the task of making decisions while caring for
people experiencing pain, and for evaluating the outcomes of their decisions (Ferrell et al., 2000)

The first phase of the Critical Thinking Framework includes: interpreting and organizing relevant information; identifying hidden assumptions; exploring nursing knowledge (objective and subjective); dividing the situation/information into subcomponents; finding available options; clarifying conflicting issues (such as ethical concerns); re-considering available options; combining ideas; and coming to a conclusion with confidence. This critical phase has been coined as ‘clinical decision making’ and applies to nurses’ decision making processes when assessing patients with pain (Benner & Tanner, 1987).

The second phase of the framework prompts nurses and nursing students to reflect on the outcomes of their decisions. They use their reflection to defend their conclusion, be accountable and take responsibility for the decisions they have made, reflect on and evaluate the process that was used to come to the conclusion, and use creativity and innovation to develop new ways of managing the scenario should it arise again. This framework can be used to explore why nurses and nursing students come to the conclusions they do, and can also be used to identify gaps in knowledge.

There are several tools cited in the literature that purport to assess knowledge and attitudes about pain. The most commonly cited tool is the Knowledge and Attitudes Survey Regarding Pain (KASRP) (Ferrell & McCaffery, 1997). The KASRP can be divided into two sections, which reflect phase one and phase two of the Critical Thinking Framework. In the first section of the KASRP, students are asked to complete a series of 36 true/false and multiple choice questions to test their pain beliefs and knowledge about
the administration of pain management medications. These questions address factors in phase one of the framework, e.g., hidden assumptions, consider all the options, nursing knowledge. The second section of the KASRP includes two case scenarios with two questions for each scenario regarding the assessment and treatment of pain after abdominal surgery. The scenarios force students to test their assumptions and current nursing knowledge regarding pain management (phase one) and to indirectly reflect on assumptions and knowledge to justify decisions (phase two). Nursing students are in a learning phase of professional knowledge, and may have difficulty moving between the two phases of the framework, as they lack the experience and knowledge that necessitates this transition. However, it is expected that with improved knowledge and attitudes, as well as increased experience in nursing practice, students may better transition between the critical thinking phases.
A literature search was conducted to identify previous research regarding nursing students’ knowledge and attitudes toward pain. The search was conducted in Medline, Embase, Psyc Info and CINAHL, using the search terms “nursing students” and “pain”. These search terms were also used to conduct a search in Google Scholar. The combined search yielded 725 articles. Article authors and titles were examined for duplicates and 556 articles were removed (Appendix B). The abstracts and titles of the remaining 169 articles were then reviewed for their relevance to the topic using the following criteria: studies had to be available in English; involve nursing students as part or all of the sample; and one of the outcomes had to be an assessment of knowledge and attitudes about pain. One hundred and forty-one articles did not meet the inclusion criteria, leaving 28 papers selected within the search results. A title review was conducted on the reference lists of the 28 papers and on a recent literature review by Ung, Salamonson, Hu and Gallego (2016) regarding nursing and medical students’ knowledge and attitudes toward pain. Based on the title review, three additional articles were selected for abstract review and found to meet the inclusion criteria for the full review. This resulted in the identification of 31 studies that met the inclusion criteria for full review and were consequently summarized in a literature review table, sorted based on the type of instrument used or qualitative study design (Appendix C).

The reviewed studies were conducted in the United States of America; Hong Kong; Jordan; Israel; Iran; Taiwan; England; Mexico; France; New Zealand; Philippines;
Australia and Canada. The years of publication were from 1981 to 2016, and sample sizes ranged from 16 to 1149 participants. A total of 18 measurement tools were used to describe knowledge and attitudes about pain, thirteen of which are published: the KASRP; the Pediatric Nurses Knowledge and Attitudes Survey Regarding Pain; the Patient Pain Questionnaire; the Palliative Care Quiz for Nursing; the Palliative Care Knowledge Examination Survey; the Cancer Pain Knowledge Questionnaire; the Survey of Knowledge and Beliefs Regarding Pain, the Nurses’ Attitude Survey; the Pain Management Principles Assessment Test; the Pain Knowledge Questionnaire; the Clinical Decision-Making Questionnaire for Pain Management; the Pain Knowledge Beliefs Questionnaire and the Daily Content Process Questionnaire (Al Khalaileh & Al Qadire, 2013; Al-Khawaldeh, Al-Hussami, & Darawad, 2013; Al Qadire, 2014; Arber, 2001; Briggs, 2010; Briggs, Carr, & Whittaker, 2011; Brockcopp, Ryan, & Warden, 2003; Chan & Hamamura, 2016; Chiang, Chen, & Huang, 2006; Duke, Haas, Yarbrough, & Northam, 2013; Evans & Mixon, 2015; Goodrich, 2006; Greenberger, Reches, & Riba, 2006; Hunter et al., 2008; Igier, Mullet, & Sorum, 2007; Latchman, 2014; Lasch et al., 2002; Lebovits et al., 1997; Mackintosh-Franklin, 2014; Ortiz et al., 2015; Owens, Smith, & Jonas, 2014; Plaisance & Logan, 2006; Rahimi-Madiseh, Tavakol, & Dennick, 2010; Shaw & Lee, 2010; Sheehan, Webb, Bower, & Einsporn, 1992; Watt-Watson et al., 2004). Five studies used unique, unpublished measurement tools and two studies used semi-structured interviews (Chiu, Trinca, Lim, & Tuazon, 2003; Diekmann & Wassem, 1991; Gillmore & Hill, 1981; Hadjistavropoulos et al., 2015; Watt-Watson, 1987).
The following review is organized by measurement tool, beginning with the most commonly used tool, and then further organized by the country or region where the study was conducted.

**Studies that used the KASRP tool**

Originally developed by Ferrell and McCaffery in 1987, the KASRP is a 37-item tool developed to assess knowledge and attitudes about pain among practicing nurses, nursing students, and other healthcare professionals. Originally, it was used as a pre- and post-test of educational interventions, however it can be used as a stand-alone test of knowledge and attitudes (Ferrell & McCaffery, 1997). The KASRP contains a mixture of true/false, multiple choice, and case study questions that cover the following topics: fundamental pain physiology; pain assessment; pharmacology; non-pharmacologic interventions to alleviate pain; and trustworthy signs of the intensity of a patient’s pain. McCaffery and Robinson (2002) consider an 80% score on the KASRP to be the lowest score needed to ensure adequate pain management practices. The test-retest reliability of the KASRP was assessed by repeat testing in a continuing education class of staff nurses and found to have acceptable reliability \( r > 0.80 \) \( (n = 60) \). Internal consistency was assessed for both knowledge and attitudes using items relevant to each domain and determined to be acceptable \( \alpha r > 0.70 \). Details about classification of items into each of the two domains was not provided (Ferrell & McCaffery, 2012).

Six cross-sectional studies used the KASRP to investigate the knowledge and attitudes of nursing students regarding pain in Asia (Al Khalaileh & Al Qadire, 2013; Al-Khawaldeh et al., 2013; Chan & Hamamura, 2016; Chiang, Chen & Huang, 2006;
Greenberger, Reba & Riba, 2006; Rahimi-Madiseh et al., 2010). Sample sizes ranged from 104 to 1149 participants.

A cross-sectional study in Hong Kong recruited a convenience sample of 104 students enrolled in a three-year master’s entry-level nursing program. Although this was a graduate level program, students were pre-nursing registration with many having degrees in domains other than nursing. Forty-five participants were in year one, and 59 in year three of the program. The mean KASRP score (standard deviation) for year one students was 20.4% (3.8) and for year three students was 21.4% (3.2), revealing suboptimal pain knowledge and attitudes towards pain, and little difference between the two groups. The three questions with the lowest correct responses were based on the case scenarios involving the assessment and management of patients with cancer pain. In one example the patient was smiling, and in another the patient was grimacing. In both cases the patient reported a pain level of eight out of ten. General pain questions, such as whether elderly patients can handle opioids for pain relief and if spiritual views affect how patients perceive pain and suffering, were those most likely to be answered correctly (Chan & Hamamura, 2016).

In a quasi-experimental study, 192 Taiwanese nursing students were recruited by convenience sampling to complete a modified version of the KASRP regarding pediatric pain assessment and management before and after attending a pediatric education program. The four-hour pediatric pain education program instructed participants on the following topics: misconceptions about children’s pain; various pain assessment tools for children; pharmacological pain management for children; and nonpharmacological pain management for children. Topics were addressed through didactic teaching, interactive
discussion, and video presentations. The questionnaire used to measure knowledge, attitudes, and self-efficacy was modified by the authors based on the work of McCaffery and Ferrell (1997) and Manworren and Hayes (2000). Thirty-five of the questions from the KASRP were utilized, plus six additional questions regarding self-efficacy that were developed by the authors. The students had significantly higher KASRP scores after the educational program (91.4%) versus before (55.0%) (p < .001). Prior to pain education, 73.4% of students indicated they were fairly confident at assessing and managing pediatric pain; there was a statistically significant increase to 87.1% after the program (p < .001). Pharmacological knowledge was a topic in need of improvement amongst participants as the authors found that knowledge in this area did not increase after the education program (Chiang, Chen & Huang, 2006).

Two of the studies using the KASRP were conducted in a convenience sample of undergraduate nursing students in Jordan. Al-Khawaldeh et al., (2013) examined pain knowledge and attitudes in 240 final year nursing students from three governmental nursing schools located in northern, central, and southern parts of Jordan. The mean KASRP score (standard deviation) for the sample was 34.1% (9.9). The questions regarding the physiology of pain and pharmacology were answered incorrectly most often. For example, only 31.7% of students disagreed with the statement that patients should be encouraged to tolerate as much pain as possible prior to opioid use (Al-Khawaldeh, Al-Hussami & Darawad, 2013). Another study conducted in Jordan utilized a cross-sectional, descriptive design involving a convenience sample of 144 final year nursing students enrolled in governmental universities (Al Khalaileh & Al Qadire, 2013). The mean KASRP score (standard deviation) was reported to be 16.0 (5.1) out of 40.0,
which translates to 40.0%. The authors report that students had the most difficulty with questions relating to pharmacology (Al Khalaileh & Al Qadire, 2013).

A cross-sectional survey conducted in Iran involved 146 nursing students in semester four and above (Rahimi-Madiseh et al., 2010). The mean score (standard deviation) on the KASRP was 37.0% (7.7). Questions with the highest number of incorrect responses were related to pharmacology, patients’ self-reports of pain, and the administration of medications that are prescribed to be given as needed, such as those found in the case scenarios of the KASRP.

A study conducted in Israel used a cross-sectional, descriptive design with first and fourth year baccalaureate nursing students (n = 565) recruited by convenience sampling to measure knowledge and attitudes, educational level, experience, and success in pain care. The 16-item Patient Pain Questionnaire was used, in addition to the KASRP, to measure knowledge and attitude levels toward pain. This added tool was originally developed to assess knowledge and attitudes regarding cancer pain (The City of Hope Pain & Palliative Care Resource Center, 2012). The authors noted that this tool was appropriate for healthcare staff as well as for patients and therefore used a modified version of it in their study, which included two additional questions added by Riddell and Fiche (1997). Psychometric testing was completed on this tool and both Chronbach alpha (\( \alpha = 0.73 \)) and test-retest reliability (\( r = 0.92 \)) were reported. To shorten the length of the overall questionnaire, the authors excluded questions involving specific drug preferences and doses as these were considered less critical. Results of this study indicated that educational level was the strongest influencer of knowledge and attitudes about pain among nursing students. The questionnaire was scored by combining the results of both
surveys and providing a score between one and seven. First year students scored 3.7 while fourth year students scored 4.9 (an increase of 19.3%, p < .001). The authors did not report a standard deviation for the group scores (Greenberger, Reches & Riba, 2006).

In north west England, nursing students enrolled in a pediatric nursing program (n = 127) were surveyed using a modified version of the KASRP before and after an educational intervention. Students were split into two groups: an intervention group (n = 64), and a comparison group (n = 63). In the second year of their program, the intervention group participated in three, three-hour workshops provided by a nurse specialist in pain. The comparison group received this same education in the third year of the program. The workshops involved critical skills, and acute and continuing care of children and young adults. A total of 82 questionnaire sets, including both pre and post questionnaires, were completed. The participants in the intervention group had slightly better scores after the workshop when compared with their scores beforehand. Students in the intervention group demonstrated greater knowledge levels related to pathophysiology, pharmacology, and pain management after the workshop. The authors did not explain modifications made to the KASRP; they also did not report overall mean scores for before and after the workshop, nor significance levels (Owens, Smith & Jonas, 2014).

Four studies that utilized the KASRP were conducted in the United States (Duke, Haas, Yarbrough & Northam, 2013; Evans & Mixon, 2015; Goodrich, 2006; Plaisance & Logan, 2006). Evans and Mixon (2015) surveyed 117 undergraduate, second-semester, junior-year nursing students in a cross-sectional study. Students participated in a simulation exercise about post-operative pain and then completed the KASRP. The simulation utilized a high-fidelity mannequin and the scenario focused on a 20-year old...
male who was post-operative day one after spinal surgery. The simulation exercise included a scripted sequence of events that included assessment, measurement, and management interventions. The simulated patient was assigned a fear of addiction to add a sense of reality to the scenario. The mean score (standard deviation) was 70.4% (8.6) after the exercise. Students were asked to reflect on the simulation as a means of education about pain, and the authors noted that some students (without stating how many) reported that they learned from the experience while others felt negatively about it. It was reported that students scored higher than anticipated on the question regarding addiction. Students scored lowest on the question regarding choosing a correct dose of medication.

A study conducted in Texas included a convenience sample of junior and senior year nursing students ($n = 162$) and nursing faculty ($n = 16$). Mean KASRP scores (standard deviation) for each group were as follows: 59.7% (6.3) for first-semester junior students; 61.2% (8.1) for second-semester junior students; 67.6% (6.8) for first-semester senior students and 71.0% (13.3) for nursing faculty. Questions regarding knowledge of medications were most often incorrectly answered, and the case studies (involving pain reporting and medication administration) were done poorly by most students. Faculty had most difficulty answering questions regarding the administration of pain medication. The authors noted that, although it is possible that knowledge involving medications improves with experience in a clinical environment, results also revealed a deficit in what was being taught and/or retained by both faculty and students (Duke, Haas, Yarbrough & Northam, 2013).
In a study conducted in Virginia, junior and senior nursing students enrolled in a baccalaureate nursing program were examined longitudinally (Goodrich, 2006). Students completed the KASRP at the beginning and end of each semester, over a two-year period. Faculty members were also asked to complete the survey and answer open-ended questions, developed by the author, regarding the inclusion of pain assessment and management content in the nursing program. Sample sizes were not reported. Mean KASRP scores were also not reported, however areas of strength and weakness were identified. In general, senior students performed better than junior students, and junior students performed better than beginner students. Many students correctly identified that patients, not clinicians, rate their own pain intensity best. However, gaps in understanding were shown to be evident in the areas of pain experienced during sleep, believing patients’ self-reports of pain, incidence of respiratory depression, equi-analgesic conversions, use of placebos, use of promethazine as a potentiator of opioid analgesics, and the definitions of addiction, tolerance, and physical dependence. Both faculty and students lacked knowledge in the area of ceiling effects of opioids and differentiating addiction from tolerance and physical dependency.

A descriptive study exploring nursing students ($n = 313$) knowledge and attitudes about pain was conducted in Louisiana (Plaisance & Logan, 2006). Using random sampling, one quarter of students from both the associate degree and the baccalaureate program were selected to participate. The associate degree program is completed in 24 months and prepares students to become Registered Nurses. The baccalaureate program is completed in 48 months and also prepares students to become Registered Nurses, but provides students with more in-depth study and a degree that could lead to higher
education. The mean KASRP score (standard deviation) for all students was 63.6% (10.6). Baccalaureate students scored significantly higher (65.0%) than those in associate programs (60.8%), (p < .001). The authors did not report standard deviations for each group mean score. The highest number of incorrect responses was reported for questions regarding pharmacology and side effects of narcotic medications.

**Studies that used one measurement tool, other than the KASRP**

The Pediatric Nurses Knowledge and Attitude Survey Regarding Pain, also referred to as the Pediatric Nurses Knowledge and Attitude Survey, was developed by Manworren and Hayes (2000). This version of the KASRP was developed to provide content relevant for nurses caring for the pediatric population (excluding oncology nursing). Amendments were created by having skilled pediatric nurses review the questionnaire and identify areas that were not applicable to pediatrics. The authors report that revisions were made with the approval of the original KASRP authors to ensure that the changes did not affect the integrity of the questionnaire, although the process for doing so was not reported. The stability of the tool was reported to have been verified by retesting between six and eight weeks after initial questionnaire administration. No test-retest statistics were reported.

The Pediatric Nurses Knowledge and Attitudes Survey Regarding Pain was used with nursing students in a descriptive, cross-sectional study conducted in Mexico. One hundred and eleven hospital-based pediatric nurses and 300 university nursing students were surveyed. For the purposes of this review, only results for nursing students are included in this discussion. Final scores on the survey revealed that nursing students had a mean score (standard deviation) of 40.3% (7.5). Students had most difficulty with
questions about pharmacology and distinguishing between opioids and non-opioid medications (Ortiz et al., 2015).

The Palliative Care Quiz for Nursing is a tool that contains 20 true or false questions that are reported to test knowledge levels, inspire discussion, and recognize fallacies in relationship to palliative care. Originally developed by Dieckmann, Zarit, Zarit and Gatz (1988) and Pratt, Wilson, Benthin and Schmall (1992) as a knowledge test for Alzheimer’s disease, alcohol problems, and depression later in life, this questionnaire was found to have components consistent with knowledge of ageing and health. An advisory committee of expert nurses developed this questionnaire into the current version of the Palliative Care Quiz for Nursing. It has been reported that an acceptable score for representing adequate knowledge levels is one greater than or equal to 75.0% with this tool (Ross, McDonald, & McGuinness, 1996). Two studies were conducted utilizing this quiz on cohorts of nursing students (n = 62 to 220) (Al Qadire, 2014; Arber, 2001).

In Jordan, nursing students enrolled in the second year and higher of baccalaureate nursing programs across five nursing schools were recruited (n = 220) by convenience sampling to participate in an online survey to gain an understanding of students’ comprehension of palliative care. The Palliative Care Quiz for Nursing was used to test knowledge levels related to palliative care, with a resulting mean score (standard deviation) for the total group equaling 8.1 (3.1) out of 20.0. Students held a number of misconceptions about palliative care, such as associating the severity and extent of a disease with the selection of pain treatments and the belief that emotional detachment is a prerequisite for the provision of palliative care services. Al Qadire (2014) concluded that
this lack of knowledge was related to a lack of palliative care education in their nursing curriculum.

A pre-test, post-test design was used in England to study a convenience sample of 33 nursing students who completed the Palliative Care Quiz for Nursing. Participating students were enrolled in an elective palliative care module consisting of 50 hours of education related to palliative care, a one-week hospice placement, and a written assignment on the material covered in the module. The quiz was administered before and after the module to assess its impact on knowledge about palliative care. The results were reported as differences in scores before and after the module for each question, rather than an overall mean score. There was a significant increase in post-quiz scores for questions involving end of life care (p = .022), adjuvant therapies (p = .004), drug addiction (p = .001), respiratory depressants’ usefulness in end of life care (p = .022), and the use of the medication pethidine for chronic pain (p = .001). Remaining deficits in knowledge involved the medication codeine and its side effects, patient sedation, and the appropriate use of placebos. At the end of the study, the results of the tool were discussed with students in order to clarify items that were answered incorrectly. Arber (2001) recommends the implementation of instructive modules as an educational tool in British nursing students to address deficits in knowledge.

One study used the Cancer Pain Knowledge Questionnaire, which was developed at the University of Wisconsin-Madison to assess cancer pain knowledge levels. This tool is comprised of eighteen true/false and multiple choice questions, and correct answers yield a cancer pain knowledge score (Sheehan, Webb, Bower & Einsporn, 1992). Many of the questions are similar to those found in the KASRP tool. This questionnaire was applied in
a cross-sectional study using a convenience sample of final year nursing students (n = 82) in three of the seven colleges in northeastern Ohio. The mean score for the total group was 49.0%. Knowledge deficits appeared in the following areas: 73.0% underestimated the possible effectiveness of treatment; 29.0% believed that maximum analgesic therapy should be given to patients with a prognosis of less than 12 month; 55.0% believed that increasing cancer pain is related to tolerance rather than progression of disease; 58.0% believed that the preferred route of administration is intravenous rather than oral; and 37.0% believed that the level of respiratory depression (but not constipation) would not lessen with repeated opioid administration. Statistics other than mean scores were not reported (Sheehan, Webb, Bower & Einsporn, 1992).

**Studies that used more than one measurement tool**

Four studies used a combination of questionnaires to test knowledge and attitudes about pain in the United States and Canada. The KASRP, the Cancer Pain Knowledge Questionnaire, and the Survey of Knowledge and Beliefs Regarding Pain were each used in a study conducted on a convenience sample of nurses, physicians, pharmacists, and medical/nursing students across three hospitals in the United States. Hospital sites included a large city hospital, a private community hospital, and a state medical school-based hospital in New York City (n = 686). The Survey of Knowledge and Beliefs Regarding Pain is a 23-item questionnaire developed based on a review of existing instruments. The content validity was 90.0 % on 18 of 23 items on the questionnaire; the other five items on the questionnaire received between 60.0–80.0 % (Ferrell, McGuire, & Donovan, 1993). The overall mean correct score was 56.0% (standard deviation not provided). The authors do not report mean correct scores for each group, but students
were reported not to have differed from other groups involved in the study. Lebovits et al. (1997) recommend the development and testing of educational interventions to address knowledge deficits about current pain management standards.

Latchman (2014) used the Nurses Attitudes Survey and the Pain Management Principles Assessment Test to measure knowledge and attitude in a cross-sectional study conducted in a convenience sample of final year, undergraduate nursing students \( n = 41 \) in the southeastern United States. The Nurses Attitudes Survey was created by McMillan et al. (2000), has 25 items and uses four-point Likert-type scales to assess attitudes toward pain management. The Pain Management Principles Assessment Test (McMillan et al., 2000) is a multiple choice test with 31 questions that test pain management knowledge specifically. The authors consider 70.0% to be a passing score. Latchman reported a mean score (standard deviation) of 19.4 (3.0) or 63.0% on the test, with only 17.0% of students receiving a score of 70.0% or higher. Areas of concern involved pain medication pharmacology, suitable time to treat pain, the use of cutaneous stimulations for pain relief, and complete pain relief as the foremost aim of pain management practices. Results from the Nurses Attitudes Survey found that the majority of students agreed that distraction can reduce a patient’s pain level, absence of pain expression does not imply the absence of pain, and continual assessment is essential for suitable pain management.

In a descriptive, exploratory study 265 nursing students (100 second-year students, 85 third-year students, and 80 fourth-year students) were recruited by convenience sampling to complete the Pain Knowledge Questionnaire and the Clinical Decision-Making Questionnaire for Pain Management (Brockcopp, Ryan, & Warden, 2003). The Pain
Knowledge Questionnaire is a 25-item unpublished tool created by the authors to assess knowledge levels about pain amongst nursing personnel. A content validity assessment is reported to have been conducted by a group of six nurses that specialize in the field of pain management. Reliability testing was not reported for this instrument. The Clinical Decision-Making Questionnaire for Pain requires participants to use five-point Likert scales to report the amount of time and energy they would spend managing the pain of different groups of patients. Content validity was determined by a group of five nurses that specializes in the field of pain management. Reliability testing was not reported on this tool.

The purpose of the study was to investigate preconceived ideas towards groups of patients relative to the management of their pain. Participants were asked to identify the amount of time and energy they would spend caring for specific patient groups who report the same pain scores. Patient groups were determined based on diagnosis and age, given that they reported the same pain score. Results revealed that 68% of second-year, 62% of third-year, and 73% of fourth-year nursing students would spend the maximum amount of time and energy managing the pain of patients with Acquired Immune Deficiency Syndrome (AIDS). In terms of time and energy spent managing the pain of cancer patients, 81%, 83% and 84%, respectively, reported they would expend their maximum amount of energy and time. Subsequently, 50%, 16% and 43% of second-year nursing students; 51%, 20%, and 46% of third-year students; and 57%, 17%, and 45% of fourth-year students would spend the maximum amount of time and energy managing the pain of suicidal patients, patients with a history of substance abuse, and the elderly, respectively. In general, nursing students’ responses to cancer patients’ pain was the most
positive (as indicated by their report of intent to spend the highest duration and energy), and their responses to those who had a history of substance abuse were the most negative (indicated by their report of intent to spend least duration and energy).

In Canada, a six-year study conducted by Hunter et al. (2008) investigated the effectiveness of an interfaculty pain assessment and treatment curriculum using the Pain Knowledge and Beliefs Questionnaire and the Daily Content and Process Questionnaire. The Pain Knowledge and Beliefs Questionnaire was developed by a research committee based on previous research. The 40-item questionnaire addresses topics such as pain beliefs and knowledge, and the need for inter-professional collaboration regarding pain assessment and management. This tool has both pre- and post-test versions. These two versions are similar, however, the direction of the correct answer is reversed on the post-test. The Daily Content and Process Questionnaire is a questionnaire that invites students to provide feedback about curriculum content and development regarding inter-professional sessions and working groups’ case responsibilities.

Different versions of this tool are used to evaluate different curriculum sessions. One version has nine - five-point Likert scale questions, and one general evaluation question. The version used for evaluating small group sessions has 12 five-point Likert scales questions regarding curriculum content, process, and general rating (Hunter et al., 2008). Hunter et al. (2008) recruited students in the second and third years of dentistry, medicine, nursing, pharmacy, physical therapy, and occupational therapy programs (n = 817). The curriculum, titled “Pain: A Multidimensional Issue”, involved 20 hours of content taught over three and a half to five days and delivered via focus groups, inter-professional groups, face-to-face interactions, and the patient panels. The curriculum
focused on basic pharmacology theory, pathophysiology, impacts of pain, types of pain, pain in different populations, quality-of-life issues related to pain, profession-specific issues with pain, and epidemiology. The course was administered annually from 2002 and 2006, and data was collected to measure changes in knowledge in the pre- and post-educational program periods using the Pain Knowledge and Beliefs Questionnaire. Each year there was a significant difference between pre- and post-questionnaire scores (14% to 17% improvement, p < .001). The Daily Content Process Questionnaire was used to gather students’ feedback on the curriculum content and the process. Results suggest that 85–95% of students rated aspects of the workshop highly.

Case Vignettes

Three studies, two in Europe and one in New Zealand, utilized case vignettes to investigate the knowledge and attitudes of nursing students (n = 214–430) (Igier, Mullet & Sorum, 2007; Briggs, 2010; Shaw & Lee, 2010). In France, Igier, Mullet and Sorum, 2007) investigated how nursing personnel judge patients’ pain. Nurses, nursing students, and nurse’s aides (n = 214) recruited by convenience sampling were presented with 48 case vignettes describing an elderly patient suffering from osteoarthritis. The patient showed various levels of signs and symptoms expressed using facial grimacing, abnormal body position, restriction of movement, complaints about pain, and signs of possible depression. Students were asked to use a 19 centimetre Likert scale that ranged between “no pain” and “extreme pain” to evaluate the amount of pain the patient in each scenario was experiencing. The findings suggest that the three most important factors in judging pain are: socially engaging with the patient, patients’ aversion to altering their body position, and patients’ dislike of body movement altogether. Study participants
consistently correctly reported the patient was experiencing pain. Igier, Mullet and Sorum (2007) suggest a follow up study examining how healthcare personnel, patients, and their family members integrate the key signs of pain into pain assessments, and an investigation of how these signs of pain compare with how patients score their own pain.

Briggs (2010) surveyed 270 nursing students in the United States by using the case vignette portion of the KASRP. The purpose of the study was to determine the accuracy of nursing students’ pain assessments and treatment selections when caring for patients with pain. Results from the KASRP case vignettes reported that 87.4% of students correctly rated the pain of a patient who grimaced while turning in bed following abdominal surgery. However, only 69.6% of students correctly rated the pain of a clinically identical patient reporting pain while simultaneously smiling and talking with visitors. Students were asked to comment on what influenced their decision making regarding the case vignette questions. Qualitative data from these questions revealed inaccurate knowledge and beliefs regarding pain management. Specifically, students seemed swayed by behavioral manifestations or non-verbal cues by patients. Students were noted allowing behaviors or non-verbal cues to over-ride what patients reported their pain levels to be. For instance, if the patient stated their pain level was eight on a ten-point scale, but showed no physical signs of pain, students stated they were less likely to administer opioids. Students also tended to assign patients a pain score somewhere in the middle of a patient’s self-reported pain levels and their (the nurse’s) perception of the patient’s pain level. Briggs (2010) suggests that the assessment of pain by a nursing student does not necessarily result in the student providing adequate pain management. The author recommends that pain knowledge and attitudes surveys be conducted early in
nursing curricula—prior to teaching about pain theory—and that pain theory teaching and learning continue throughout the educational program.

In New Zealand, Shaw and Lee (2010) developed a tool to examine case vignettes that tested misconceptions about adults with chronic nonmalignant pain. They used convenience sampling to recruit 430 students across all three years (six semesters) of the New Zealand baccalaureate nursing program. Overall, students had misconceptions about patients with chronic nonmalignant pain, however, students in semester six had slightly fewer misconceptions than students in semesters one and four. Specific areas of concern were: pain tolerance amongst those with chronic pain (38.2%); chronic pain triggered by psychosomatic impairment (59.0%); chronic pain caused by tension or stress (79.6%); patients exaggerating pain symptoms in order to increase the possibility of pursuing a successful litigation (47.9%); manipulative behavior by those with chronic pain (34.5%); depression related to chronic pain (64.3%); and the risk of addiction with opioid use (54.8%). Shaw and Lee (2010) recommended including pain assessment and management education in nursing education.

Semi-Structured Interviews

Two studies used semi-structured interviews to investigate nursing students’ knowledge and attitudes regarding pain (Mackintosh-Franklin, 2014; Lasch et al., 2002). In England, Mackintosh-Franklin (2014) used a qualitative pre-post study to investigate the impact of experience on undergraduate student nurses’ responses to patients in pain. Progression through the nursing program was used as a measure of experience. Sixteen participants were interviewed twice, eighteen months apart. The first interview occurred after students had experienced two clinical placements (one surgical and one medical).
each of eight weeks’ duration. The second interview occurred after students had completed three additional eight-week clinical placements. Results of the first interview indicated that all students lacked interest in the subject of pain and appeared to consider pain to be a normal part of the patient experience. Results of the second interview found that five students had developed sensitivity, insight, and critical thinking toward pain not exhibited in the first interview. However, students who showed little interest in pain were found to continue to believe that pain was a normal part of the patient experience. Findings from this study suggest that increased exposure to clinical practice can result in student development of interest in pain management, and that students must have an interest in pain and pain management in order to appropriately respond to social norms toward pain in the clinical setting.

In the United States, Lasch et al. (2002) explored the reasoning behind knowledge deficits and attitudinal barriers to pain management amongst medical students, nursing students, and faculty (n = 72) who participated in a cancer pain management education module. Using a qualitative design and purposive sampling, participants participated in interviews and/or focus groups, dependent on their willingness to participate in one or both. Semi-structured interviews involved both open and closed questions regarding pain and cancer pain management. Focus groups were facilitated by the principal investigator, who first asked participants questions to test their retention of the material presented in the lectures. Subsequently, participants were asked open-ended questions about their experiences with pain and cancer pain management.

Three central themes, each with several subthemes, emerged from this study. The first central theme was the prioritization of pain, with two subthemes: the relative importance
informants’ assigned to learning about pain and cancer pain; and the degree to which participants viewed management of cancer pain as a responsibility of primary care providers or specialists. The second central theme was participants’ knowledge of pain. Three subthemes emerged, specifically: insufficient practitioner familiarity with pain medications and other treatments; the limited degree to which pain and cancer pain management were denoted in curriculum; and the role of well-informed faculty members and advisors in the distribution of evidence about pain management. The third central theme was the meaning(s) of pain, with the following two subthemes: opioid phobia (fear of dispensing opioids in excess); and uneasiness concerning the subjectivity of pain.

**Unpublished Tools**

In five studies the authors developed unique tools to measure nursing students’ knowledge and attitudes about pain (Chiu, Trinca, Lim & Tuazon, 2003; Diekmann & Wassem, 1991; Gillmore & Hill, 1981; Hadjistavropoulos et al., 2015; Watt-Watson, 1987). In an older, exploratory study to investigate nursing decisions, Gillmore and Hill (1981) recruited 96 nursing students, describing half of the participants as “beginners” and half as “advanced”. The authors studied students individually, having each read a description of a patient and then view a videotape in which the patient complained of pain and requested medication for relief. Clarity of the diagnosis varied between “ambiguous” and “unambiguous”, and the physical attractiveness of the patient was altered using make-up to make them either more, or less, appealing. The students’ reactions were assessed using a questionnaire that measured participants’ impressions of the patient and participants’ assessments of the complaint. The questionnaire was developed by the authors and was not published. It involved 15 questions to evaluate
patients’ pain; results were scored on Likert scales ranging from one to nine. Twenty-seven questions to measure students’ personal impressions of the patient, the extent of perceived illness, and the physical desirability of the patient were also included in the questionnaire. Results revealed that the key factor that influenced the students’ evaluations of patients’ complaints of pain was diagnostic ambiguity, and they assessed patients with ambiguous diagnoses as having less severe, less genuine pain. Students’ reactions to patients’ pain was not affected by the patients’ level of “attractiveness”.

A convenience sample of 938 nursing students in the United States was recruited into a cross-sectional study designed to examine perceptions and knowledge levels about cancer pain. The 26-item measurement tool, which was neither identified nor provided, was developed at the Wisconsin-Madison School of Medicine. Only nine percent \((n = 83)\) of respondents indicated that pain should be endured without medication. Approximately one-third of the sample indicated that pain is not better managed when analgesics are given around the clock compared to when given on an as-needed basis (Diekmann & Wassem, 1991).

One hundred and fifty final year nursing students from Australia \((n = 81)\) and the Philippines \((n = 69)\) were recruited by convenience sampling to participate in a cross-sectional study to examine knowledge about pain. Using evidence from current literature, the authors developed a 23-item questionnaire. Questions involved the following topics: complex regional pain syndrome (CRPS); central sensitization; allodynia; cognitive-behavioral therapy; the N-Methyl-D-Aspartate (NMDA) receptor; opiate use; referred pain; chronic back pain; radiating leg pain; cost of chronic pain; phantom pain; disability; acute pain; tricyclic antidepressants; nonsteroidal anti-inflammatory drugs (NSAID’s)
and opiates. The overall mean score of 38.6% suggested knowledge deficits, particularly in pharmacology and in distinguishing differences between acute and chronic pain. Most students reported receiving education with respect to pain management (Chiu, Trinca, Lim & Tuazon, 2003).

In Canada, knowledge related to the assessment and management of pain were examined in graduate nurses \( (n = 106) \) and second- and third-year baccalaureate nursing students \( (n = 101) \) were surveyed using an unpublished tool, prior to attending a voluntary pain presentation. The questionnaire had 18 true/false, multiple choice, and fill-in-the-blank questions that evaluated pain assessment and medication administration (mainly opioid administration). Watt-Watson (1987) reported an overall mean score (standard deviation) of 52% (14), but did not publish the survey tool, nor report how it was scored. Graduates of a baccalaureate nursing program had the highest mean score (standard deviation) of 59% (15). Mean scores (standard deviations) for diploma nursing program graduates were 55% (13), for third-year BScN students were 54% (15), and for second-year BScN students were 44% (13). The author reported all cohorts had low levels of knowledge about the duration and mechanism of action of narcotic medications.

Hadjistavropoulos et al. (2015) conducted a study of students across various health care programs in Canada. A convenience sample of 73 students enrolled in nursing (third or fourth year), medicine, kinesiology and health studies, pharmacy, physical therapy, social work, and psychology was recruited to explore students’ contentment with a one-day inter-professional education (IPE) workshop on pain management. The IPE event was a seven-and-a-half-hour workshop that used a combination of learning approaches, including large group presentations. Material covered involved the transition of patients
from acute to chronic pain. The IPE also involved case presentations from two clients with chronic pain, small inter-professional group case discussions, and large workshop-wide discussions. After attending the IPE workshop, students completed a questionnaire that explored their satisfaction with various topics, such as case-based learning, knowledge about pain management, and the overall program. Responses for each topic area were reported using five- and ten-point Likert scales. Scores were averaged to create a mean satisfaction score. Results suggest that students perceived that their knowledge of pain management was higher after the IPE workshop.

**Curriculum**

Using a cross-sectional study design, Briggs, Carr and Whitaker (2011) used the U.K. Pain Education Questionnaire to investigate the nature, content, and learning strategies used to educate dentistry, medicine, midwifery, nursing, occupational therapy, pharmacy, physiotherapy, and veterinary science students at major universities in the United Kingdom. Purposeful sampling was used to recruit 74 faculty members directly involved in planning, teaching, or assessment of pain content from several university programs. Participants reported between two and 158 hours (mean of 12.0 hours) of identifiable pain content in their undergraduate curricula. Few faculty participants reported providing inter-professional education regarding pain, and only four sites reported the International Association for the Study of Pain (IASP) curricula recommendations had been fully implemented. Forty percent of programs reported that they had not integrated the IASP curricula at all, and 41.7% reported partial integration.

recruited 540 second-entry (students who had previous degrees or had completed a two-year nursing program) nursing students, to participate in the study. Students completed the Pain Knowledge and Beliefs Questionnaire both before and after the educational intervention. There was a statistically significant improvement in overall mean scores post intervention (66%) (p < .001). The Daily Content Process Questionnaire was used to assess curriculum process and content. A high percentage of students (74% to 92%) ranked their satisfaction as exceeding or meeting their expectations. Items with higher than a 40% change in correct scores involved: opioid use with elderly patients and those with chronic non-cancer pain, opioid-related constipation, analgesics, and placebo use. The authors did not discuss questions that were answered poorly.

**Summary**

Thirty-one studies, using 18 measurement tools were used to investigate pain knowledge and/or attitudes of nursing students, were reviewed. Across these studies, the KASRP was implemented most often (11 studies); one study reported using a modified version of the KASRP in a study of pediatric nurses. Several other published tools were used, but frequently in only one or two studies. Five studies used unpublished tools, limiting the information available about the tool and inhibiting its availability for re-use. In addition, some studies used case vignettes and semi-structured interviews.

Regardless of the tool used, all studies reported inadequate pain knowledge and/or inappropriate attitudes regarding pain management/pain sufferers amongst nursing students. Of the studies that utilized educational interventions, some found significant differences in knowledge and/or attitudes after the intervention took place. Certain
studies that did not involve an educational intervention recommended the integration of one into future research.

Most studies of students’ knowledge and attitudes regarding patients’ pain utilizing cross-sectional designs did not address changes over time or changes with intervention. Many studies had small sample sizes making it difficult to generalize to other settings, and most employed convenience sampling techniques, which further limits their generalizability to other locations. Many authors, especially those of older studies, did not report statistical results from the responses to questionnaires, but rather provided narrative descriptions of results. Four studies with nursing student participants were conducted in Canada. Of these four, one is almost thirty years old (Watt-Watson, 1987), one is eight years old (Hunter et al., 2008), and two measured changes in knowledge and attitudes after the implementation of a pain education program. There are no recent Canadian studies without an educational intervention that investigates the knowledge and attitudes of nursing students. Finally, no Canadian studies that measure the knowledge and attitudes of nursing students using the KASRP tool were found.

The KASRP tool is a widely used, well-developed tool that is reported to measure both knowledge and attitude levels about pain in nursing students. The KASRP tool has been utilized in multiple countries (United States, Hong Kong, Jordan, Israel, Iran, Taiwan and England), and with nursing students in all years of diploma, baccalaureate, or graduate study. The authors are explicit in reporting content and validity testing results. The KASRP study sample sizes ranged from 104-565, with most studies reporting sample sizes at the lower end of this range. The majority of studies that employed the KASRP utilized cross-sectional designs; some used longitudinal designs with the use of an
educational intervention. Within the literature reviewed, the KASRP is the tool most often used to measure knowledge and attitudes amongst nursing students. Ferrell and McCaffery (1997) who developed the KASRP are known well in the pain community. Margo McCaffery was a founding member of the IASP, a member of the World Health Organization’s Expert Committee on Cancer Pain Relief, and instrumental in the development of guidelines for pain control (Seisser & Ward, 2002). Dr. Betty Ferrell is the Director of the Division of Nursing Research and Education and is a professor at Beckman Research Institute of City of Hope. A fellow at the academy of nursing, Dr. Ferrell has published more than 350 articles in peer-reviewed journals and texts (The City of Hope Pain & Palliative Care Resource Center, 2016).
Chapter 3

Methods

Statement of Purpose and Research Questions

The purpose of this study was to examine final year, pre-registration nursing students’ knowledge and attitudes about the assessment, treatment and management of pain. The primary research question was: Are there gaps in the knowledge and attitudes of nursing students regarding pain?

Secondary research questions were: Are there differences in knowledge and attitudes regarding pain between Bachelor of Science in Nursing (BScN) and Practical Nursing (PN) students? What student or educational factors contribute to knowledge and attitudes regarding pain? What are the major gaps and strengths in knowledge and attitudes about pain? Do students report that their pain management education has been adequate?

This study utilized a descriptive, cross-sectional survey design to examine knowledge and attitudes regarding pain in pre-registration nursing students in the final year of their educational program Ontario. A cross-sectional design was chosen because of time constraints, as a longitudinal design would not have been feasible as a master’s project. A cross-sectional study is useful for providing an overview of current pain knowledge and attitudes within a cohort of senior nursing students. Such data could also be used as a baseline from which to track knowledge and attitudes in a follow-up study to measure changes as nursing students become registered nurses and enter practice.
Setting and Sample

The target population was final year pre-registration nursing students in Ontario. The sampling frame was all BScN and PN students in their final year of study in two post-secondary institutions (four sites) in Ontario, Canada. To maintain anonymity, the participating institutions are identified as School A (one site) and School B (three sites). There were 132 final year BScN students enrolled in School A and a total of 335 final year BScN (n=148) and PN (n=187) students enrolled in School B. This resulted in a sampling frame of 467 students. Sample size was calculated using the methods described by Dillman (1978). Sample size was calculated based on a 50/50 proportion (the most conservative estimate requiring the largest sample size), in which it is estimated that 50% of students receive a KASRP score of 80% or higher, assuming a confidence interval of 95%, and an error margin of 3%. This calculation called for a sample of 324 participants to be recruited into the study.

To achieve the target sample of 324 participants, the entire cohort of 467 students was approached to participate in the survey. The rationale for combining PN and BScN students into a single sample was that after graduation all nurses are authorized to care for patients who are in pain. In Ontario, the Nursing Act (1991) gives RN’s and RPN’s the ability to autonomously decide that certain procedures are necessary and carry them out. Nurses and nursing practice in Ontario is regulated by the College of Nurses of Ontario (CNO). The CNO’s practice standard, Medication Standard and the Registered Nurses Association of Ontario’s (RNAO’s) best practice guideline, Assessment and Management of Pain, outline that the assessment, planning, implementation and evaluation of those who are in pain is appropriate for nurses. The guidelines state that the
expectation is that nurses recognize their own scope of practice (based on education and experience) and that nurses perform tasks which they are equipped to do. It also notes that all nurses play critical roles in pain management (CNO, 2015; RNAO, 2013). In the guideline: *RN and RPN Practice: The Client, the Nurse and the Environment*, the CNO (2014) makes the distinction between Registered Nurses’ (RNs) and Practical Nurses’ (PNs) practice by the following a three-factor framework: complexity of care required, predictability of clients’ outcomes and the risk of negative outcomes. Both RNs and RPNs practice in environments where the management of pain falls within their scope of practice.

It is therefore within the scope of practice of both the PN and BScN students to assess and care for patients experiencing pain. Even though the decision was made to combine the groups of students for the purpose of the sample size calculation, it was noted that the KASRP tool may be able to discriminate between levels of competence, suggesting that it can distinguish between participants who have more education versus those with less. In the literature review, it was noted that senior nursing students performed better than junior nursing students (Duke et al., 2013; Goodrich, 2006; Plaisance & Logan, 2006; Hunter et al., 2008). It was also noted that educational level was the strongest influencer of pain knowledge and attitudes (Greenberger et al., 2006). Therefore, if differences in pain knowledge and attitudes existed between PNs and BScN students, the KASRP should be able to identify those differences.
Inclusion and Exclusion Criteria

The inclusion criteria were that students had to be enrolled in the final year of a nursing program at one of the two study sites and expected to graduate in 2016; able to read and write in English; and provide written consent to participate in the study. Students were excluded if they were taking final year courses but did not expect to graduate in 2016. Students were asked to complete the questionnaire only once if they attended multiple classes where the questionnaire was distributed.

Knowledge and Attitudes Regarding Pain

The primary outcome of pain knowledge and attitudes was measured with the KASRP (Appendix D). The KASRP tool was selected to study knowledge and attitudes in nursing students as it considers factors related to basic pain physiology, pain assessment, pharmacology, non-pharmacologic interventions and reliable indicators of the intensity of a patient’s pain. The KASRP was developed in 1990 by McCaffery, Ferrell O’Neil-Page and Lester (Appendix E). It has been revised over the years to reflect changes in pain management practice; the latest version was released in 2008. Questions included in the KASRP are derived from guidelines from The American Pain Society, the World Health Organization, and the National Comprehensive Cancer Network. The KASRP is available for use without permission from the authors (Appendix E). The 2008 version of the KASRP has a total of 38 questions (22 true/false and 16 multiple choice questions). For the purposes of this study, two questions were removed as two of the three medications considered in responses within the questionnaire are not available in Canada and there are no known substitutions. One question was changed slightly to reference the culture of Canada instead of the culture of the U.S.A. A summary chart with a description of
questions that have been altered or removed has been included (Appendix F). In the current study, a limited review of the KASRP was conducted by clinical experts. The KASRP is scored by calculating the percentage of correct responses; 80% is considered to be a passing score (McCaffery & Robinson, 2002). The KASRP is reported to take approximately 15-30 minutes to complete (Plaisance & Logan, 2006).

The KASRP is easy to administer and requires only a short amount of time to complete, making it feasible to collect data in classroom settings and improving the likelihood of students participating. The use of multiple choice questions makes the KASRP easy to score. The KASRP was the data collection tool most frequently used in studies measuring knowledge and attitudes amongst nursing students, thereby allowing for comparisons between the findings of this study and the literature (Al-Khawaldeh, Al-Hussami & Darawad, 2013; Al Khalaileh & Al Qadire, 2013; Chan & Hamamura, 2016; Chiang, Chen & Huang, 2006; Duke, Haas, Yarbrough & Northam, 2013; Evans & Mixon, 2015; Greenberger, Reeches & Riba, 2006; Plaisance & Logan, 2006; Goodrich, 2006; Ortiz et al., 2015; Owens, Smith & Jonas; Rahimi-Madiseh, Tavakol & Dennick, 2010).

There is a paucity of available information about the quality of the KASRP tool. McCaffery and Ferrell (2012), outline the reliability and validity of the KASRP, however they provide few details (http://www.midss.org/content/knowledge-and-attitudes-survey-regarding-pain-kasrp; Appendix E). Content validity for the KASRP was established by specialists in the pain management field. Internal consistency reliability of the KASRP was determined to be satisfactory ($\alpha > .70$). Construct validity was determined by assessing the results of nurses at differing stages of education and expertise (students,
new graduates, oncology nurses, graduate nurses and senior pain experts). Results revealed that the tool discriminates between levels of expertise. Test-retest reliability (the degree to which the KASRP results are consistent over time) was identified at \( r > .80 \) by repeated analysis with a group of registered nurses (McCaffery & Ferrell, 2012).

**Perceived Adequacy of Pain Education**

Participants were asked “Do you feel your program has provided you with adequate pain and pain management education?” in order to determine if their perception of how well prepared they were was consistent with the pain knowledge and attitudes reflected in their KASRP scores. This question was placed at the beginning and the end of the KASRP to determine if completing the questionnaire changed their perceived competence.

This approach to assessing perceived adequacy of education is consistent with the report by Sheehan, Webb and Einsporn (1992) wherein participants were asked about their perception of the adequacy of previous cancer pain education. Asked at the beginning of the survey only 12% of participants stated that they felt prepared, with an overall mean Cancer Pain Knowledge Questionnaire (CPKQ) score reported to be 49% (no standard deviation reported). The authors report a non-significant relationship between individuals’ feeling of being prepared and CPKQ scores. Lewthwaite et al. (2011) asked participant nurses to rate their pain management knowledge after taking a modified version of the KASRP, and 66% percent rated their knowledge level as ‘good’, with a mean KASRP score of 79% for all participants. Asking this question twice also allows for comparisons between those who initially thought they were adequately prepared versus those who did not, using actual scores as the *gold standard* measure of
what they actually knew.

**Demographic and Educational Characteristics**

Student participants were asked additional questions in order for the researcher to provide descriptive statistics about the population, and for the purpose of generalizing the results to other populations. Students were asked to report their age, first language, year of study in the current program, type of nursing program, if they had cared for a patient experiencing pain, questions about prior education and accreditation in health care and pain management, and whether the research team could contact them in three years to reassess knowledge and attitudes. The questions used to capture the additional measures is provided in Appendix G.

**Ethics**

Ethics approval was obtained from the Queen’s University Health Sciences and Affiliated Hospitals Research Ethics Board and the participating institutions. The proposal was then shared with appropriate authorities at both educational institutions to inform them about the research project and to ask for permission to visit the appropriate classes to recruit participants and gather data. All participants were required to sign the informed consent form (Appendix H) that outlined that participation in the study was voluntary and participants would not be compensated for their participation in the study. Individual responses to the study were not shared with course professors to protect anonymity and not interfere with students’ education.

To maintain confidentiality, unique participant identifying numbers were used on the questionnaires. Individuals were asked to provide their contact information if they consented to the research team contacting them in three years’ time for a follow-up study.
This information was transferred to an electronic spreadsheet that is kept on an encrypted hard drive, separate from the survey results. To ensure confidentiality, only unique identifiers were included with the survey data in the electronic database. Encryption and passwords were used on the researcher’s laptop. Files will be deleted from the researcher’s computer after study completion and will be transferred to an external electronic drive, with the participant log and the survey data stored separately. The paper questionnaires are stored by the researcher’s supervisor in a locked filing cabinet in a locked office in the School of Nursing at Queen’s University. All documents will be shredded and all electronic data deleted after seven years.

**Data Collection**

Members of the supervisory team consisted of faculty from both schools. A supervisory committee member contacted professors to notify them of the study and that the researcher would be contacting them to recruit and collect data. The researcher connected with professors at all sites involved in the study using the Queen’s University email server. The researcher then made arrangements with each course professor to contact students through attendance at previously scheduled course classes. Students were approached in their classroom setting at the beginning or end of a class, depending on each course instructor’s preference. A short presentation about the purpose of the study and how the information collected would be used was given to all students. A copy of the consent and questionnaire was given to each student and students were advised that participation was voluntary and if they did not wish to fill out the questionnaire they could leave it blank and hand it back to the researcher when they felt comfortable to do so. The researcher distributed the survey documents facedown and asked students to wait.
until everyone had a questionnaire in-hand and they were given the signal to begin. The researcher then timed the minimum and maximum time it took participants in the group to complete the survey by recording the time from when the students started to complete the questionnaire to when the first questionnaire was handed in to when the last questionnaire was handed in. The purpose of timing the questionnaire was to provide a comparison with completion times reported in the literature. Students were encouraged to raise their hand if they had a question about the questionnaire, and the researcher provided clarity to students if necessary, however no extra information about content was given.

At one point in the data collection process, a research assistant completed the recruitment, consent and data collection processes as two course instructors wanted the data collection completed at the same time. The researcher and the research assistant met and discussed study details and methods to ensure consistency in the processes. At the request of a course professor, the classroom attendance wherein the research assistant met with students was convened for the sole-purpose of participating in the study. This likely led to the low number of participants (n=19 out of a possible 59) for this cohort.

**Data Management**

In order to classify data by the seven cohorts, an additional identifying number was placed on the top of each questionnaire to enumerate the class. All data was then entered into encrypted Microsoft Excel spreadsheets twice (once by the researcher and once by a researcher assistant). Spreadsheets were compared for discrepancies by using the program LibreOffice to highlight cells in the original spreadsheet that differed from those in the second spreadsheet. One hundred and six (0.01%) discrepancies were found and
corrected using the original questionnaires to verify the data. Data was then exported to SPSS version 23 for analysis. Demographics were collected for each seven cohorts for the purpose of calculating response rates by class. Data captured included: 1) how many were enrolled in the class; 2) how many attended on the date that the researcher visited the class; 3) how many students were eligible for the study and chose to participate; 4) the participation rate (the number of people who participated divided by the number that attended class that day); and 5) the number who participated divided by the number who were enrolled in the program. The names of the schools that participated in the study were not entered into the database; instead schools were identified as either School A or School B.

**Handling of Missing Data**

After data entry, two KASRP spreadsheets were created for comparison. The first defined all missing responses on the questionnaire as missing, allowing certain questions/participants to be removed from analysis. The second spreadsheet was populated with missing entries imputed as incorrect answers, as would be the case on an academic exam. For example, if, on an academic course exam, a student left a question response blank, they would not receive a mark for that answer thereby equating the blank response to an incorrect response which would also not receive a mark. Using this analogy, it was deemed inappropriate to substitute missing responses with another imputed value, such as the group mean.
Statistical Analysis

Demographic Characteristics

The distribution of age was assessed using a frequency distribution and found to be not normally distributed as evidenced by a histogram. Age was then split at the median (those 22 years of age and below, and those 23 years of age and older). Age categories, as well as the median and 25th and 75th percentiles, were reported. Univariate statistics were conducted for all demographic variables (first language, nursing program, previous education in healthcare and pain management, and having cared for someone in pain before) using frequencies and percentages.

Knowledge and Attitudes about Pain

An analysis was conducted on each dataset (missing data imputed and missing cases excluded); mean, standard deviation, median score, 25th and 75th percentile, and number and percentage of participants who passed the KASRP (score of 80.0% and greater) and results were reported. A histogram, boxplot and KASRP score distribution statistics are reported in the appendices.

The differences in mean KASRP scores between the 2 datasets (missing excluded vs. missing imputed) was assessed using Student’s unpaired t-test. Mean scores were compared by program (BScN vs. PN), age categories (≤22 and >23 years), school (School A or School B), previous education in healthcare (yes or no), previous education in pain management (yes or no), and experience having cared for someone in pain before (yes or no) using unpaired Student’s t-tests. An ANOVA was conducted to assess for statistically significant differences in KASRP scores by first language (English, French, other). However, the majority of students (92.0%) reported English as the first language,
therefore language was also categorized as English vs. non-English and an unpaired Student’s t-test was used to assess for statistically significant differences between the two groups. Mean (SD) scores for each of the seven classes was calculated. An analysis of variance (ANOVA) was conducted to assess for statistically significant differences between the seven classes.

Cohen’s $d$ effect size was calculated for each independent variable. Effect size illustrates the magnitude of difference between two variables while a $p$ value only indicates a statistically significant difference exists (Coe, 2002). Cohen classified effect sizes as small ($d = 0.2$), medium ($d = 0.5$) or large ($d = 0.8$). According to Cohen, an effect size of 0.2 (small) is markedly smaller than a medium effect size. A medium effect of 0.5 is observable to the careful observer. It is also noted that a large effect size of 0.8 is the same distance above a medium effect as a small effect is beneath it (Coe, 2002).

A linear regression was conducted including the independent variables that had a $p$ value $\leq .15$ in bivariate analysis. All variables met the inclusion criteria for the linear regression: age; cared for someone in pain before; previous education in healthcare; previous education in pain management; adequacy of pre/post; school; program and language. Age was included even though the $p$ value was greater than the cut-off of <.15 because prior research suggests there is a link between age and pain knowledge and attitudes. Variables were then manually removed one at a time starting with the least significant variable (highest $p$ value). A regression was rerun each time a variable was removed, until the only variables remaining were those that had a $p \leq .05$. There were a total of six steps that led to the final reduced model (Appendix I).
To provide an indication of the knowledge gaps and strengths, an analysis was completed on individual KASRP questions to report the number and percent of participants who correctly or incorrectly answered each question (Appendix J). Major strengths in participants’ pain knowledge and attitudes were classified as any question where ≥ 90% of students answered correctly. Major gaps in pain knowledge and attitudes were classified as any question where ≤ 40% of students answered incorrectly.

The question asking about adequacy of pain education was administered at the beginning and at end of the KASRP to assess for the influence of the KASRP on the perception of adequacy of pain education. The questions were collapsed into one four-level variable: adequate before/adequate after; adequate before/not adequate after; not adequate before/not adequate after; not adequate before/adequate after. Mean (SD) KASRP scores for each level of the variable was calculated and an ANOVA was conducted to assess for statistically significant differences across levels of the adequacy variable. A p value ≤ .05 was considered statistically significant.
Chapter 4

Results

The results of the study are presented in this chapter. Included is information about the sample and response rate(s) as well as analyses of the demographic and KASRP data. A detailed breakdown of the frequency of correct and incorrect responses to each KASRP question is provided, as well as identification of areas of strength, where 90% or more participants had correct responses to questions about pain knowledge and attitudes, and areas of weakness, where less than 40% of participants had correct answers.

Sample and Response Rate

Table 1 provides an overview of sample size and response rates. Four hundred and sixty-seven participants were enrolled in the seven classes where the survey was administered, and 373 attended their respective class on the day that the survey was administered. There was a 90.1% (n=336/373) participation rate with 71.9% (n=336/467) of the target sample participating. Three hundred and seventy-three participants were given the questionnaire, 26 (7.0%) decided not to participate by handing in blank questionnaires or leaving prior to questionnaire administration, three (0.8%) did not fill out the required information and eight (2.1%) participants were not eligible because they did not expect to graduate in 2016. Of the 336 participants who completed at least some of the questionnaire, three did not complete the demographic questions (0.9%) however they did complete the KASRP and therefore were included in the analysis of the KASRP. Twelve participants (3.5%) did not respond to the question regarding being eligible to graduate in 2016; these participants’ data were treated as though they were expected to
graduate in 2016 and their responses were included in the KASRP analysis. The decision
to include these participants’ responses was based on a statement on the survey that they
should not continue filling out the survey if they do not expect to graduate in 2016. The
final sample of participants included in this analysis was 336. The amount of time
required to complete the survey was recorded for each class. The minimum time for
completing the survey was 6.2 minutes and the maximum time was 20.0 minutes.

**Table 1**

*Number and percent of participants who participated in the KASRP by survey
distribution site*

<table>
<thead>
<tr>
<th>Site</th>
<th># Enrolled</th>
<th># Attended</th>
<th># Participants</th>
<th>Participation rate % (participated/attended)</th>
<th># Participated / enrolled (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>49</td>
<td>34</td>
<td>34</td>
<td>100.0</td>
<td>69.4</td>
</tr>
<tr>
<td>2</td>
<td>59</td>
<td>40</td>
<td>19</td>
<td>47.5</td>
<td>32.2</td>
</tr>
<tr>
<td>3</td>
<td>132</td>
<td>117</td>
<td>109</td>
<td>93.2</td>
<td>82.6</td>
</tr>
<tr>
<td>4</td>
<td>49</td>
<td>42</td>
<td>41</td>
<td>98.6</td>
<td>83.7</td>
</tr>
<tr>
<td>5</td>
<td>69</td>
<td>48</td>
<td>44</td>
<td>91.6</td>
<td>63.8</td>
</tr>
<tr>
<td>6</td>
<td>40</td>
<td>29</td>
<td>27</td>
<td>93.1</td>
<td>67.5</td>
</tr>
<tr>
<td>7</td>
<td>69</td>
<td>63</td>
<td>62</td>
<td>98.4</td>
<td>89.9</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>467</strong></td>
<td><strong>373</strong></td>
<td><strong>336</strong></td>
<td><strong>90.1</strong></td>
<td><strong>71.9</strong></td>
</tr>
</tbody>
</table>

1 Results are reported by site numbers which include: BScN on four sites and PN programs at three sites

**Demographic Characteristics**

Descriptive characteristics of the study sample are provided in Table 2. Percentages
are reported as valid percent (therefore not including missing cases in denominator). One
hundred and ninety-six (58.3%) participants were enrolled in the BScN programs and 140
(41.6%) were enrolled in the PN program. The age of participants ranged from 19-62 years; mean age (SD) was 24.2 years (6.0) and median (25th, 75th percentile) age was 22 years (21, 25). Age was not normally distributed as seen in Figure 1, therefore age was dichotomized at the median of 22 years. One hundred and seventy-nine (54.6%) participants were 22 years old or younger, and 145 (45.4%) were 23 years old or older. English was reported as the primary language by 309 (92.0%) participants; French was listed as a primary language by 8 (2.4%) participants; and 16 (4.8%) participants listed ‘other’ as their primary language.

Figure 1

Histogram showing the distribution of the variable: Age

Seventy-three (22.3%) participants had education in healthcare prior to entering their nursing program. The types of prior healthcare education included: personal support worker (n=22, 6.7%); pre-health sciences (n=11, 3.4%); pre-nursing (n=7, 2.1%); medical laboratory science (n=3, 0.9%); and miscellaneous courses, programs and
certificates (n=30, 8.9%). Thirty participants (9.3%) stated that they had received previous education in pain management and, of these, 28 participants (8.7%) provided information regarding where they received their pain management education. Previous pain education was acquired in nursing programs (n=17, 5.3%) and other courses and conferences (n=13, 4.0%). Three hundred and nine (95.7%) participants had cared for someone in pain prior to completing the survey. One-hundred and eighty-seven (55.7%) participants consented to be contacted in three years for participation in a follow-up study.

Table 2

Demographic characteristics of participants

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>n</th>
<th>%*</th>
</tr>
</thead>
<tbody>
<tr>
<td>19</td>
<td>16</td>
<td>4.8</td>
</tr>
<tr>
<td>20</td>
<td>25</td>
<td>7.4</td>
</tr>
<tr>
<td>21</td>
<td>94</td>
<td>28.0</td>
</tr>
<tr>
<td>22</td>
<td>44</td>
<td>13.1</td>
</tr>
<tr>
<td>23</td>
<td>32</td>
<td>9.5</td>
</tr>
<tr>
<td>24</td>
<td>25</td>
<td>7.4</td>
</tr>
<tr>
<td>25 and over</td>
<td>92</td>
<td>28.0</td>
</tr>
<tr>
<td>Median Split (years of age)</td>
<td>Median Split (years of age)</td>
<td>22 and below</td>
</tr>
<tr>
<td></td>
<td>23 and above</td>
<td>149</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Language</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>English</td>
<td>309</td>
</tr>
<tr>
<td>French</td>
<td>8</td>
</tr>
<tr>
<td>Other</td>
<td>16</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Nursing Program</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>RN Program</td>
<td>197</td>
</tr>
<tr>
<td>PN Program</td>
<td>139</td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Previous Education in Healthcare³</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>72</td>
</tr>
<tr>
<td>No</td>
<td>255</td>
</tr>
<tr>
<td>Previous Education in Pain Management⁴</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>30</td>
</tr>
<tr>
<td>No</td>
<td>294</td>
</tr>
<tr>
<td>Cared for Someone in Pain Before⁵</td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>309</td>
</tr>
<tr>
<td>No</td>
<td>14</td>
</tr>
</tbody>
</table>

*The valid percent is reported for each item (i.e., missing responses are not included in the denominator).

1 Age: 8 missing entries (2.4%)
2 Language: 3 missing entries (0.9%)
3 Previous education in healthcare: 9 missing entries (2.8%)
4 Previous education in pain management: 12 missing entries (3.7%)
5 Cared for someone in pain before: 13 missing entries (4.0%)

**Knowledge and Attitudes about Pain**

Descriptive analyses of the KASRP scores are provided in Table 3, and Figures 2 and 3. Forty-four participants had some missing responses to the KASRP. The mean KASRP scores for the dataset where participants were excluded because of missing KASRP responses (n=292) versus the dataset where missing KASRP responses were classified as an incorrect answer was found to have no statistically significant difference (n=336) (t-test= 0.86, p= .39). The remaining analysis was conducted on the 336 participants and missing responses were classified as incorrect answers.
A passing score on the KASRP is 80% (McCaffery & Robinson, 2002). Fifteen (4.5 %) participants scored 80% or above. The mean score (SD) was 66.7% (9.1) and the median (25th, 75th percentile) was 68.4% (60.5, 73.7). The distribution of scores had a slightly negative skew (skewness= -0.388) and kurtosis of 0.198 (Figure 2; Figure 3); this falls within the acceptable range of +2 to -2 when the data are considered normally distributed (George & Mallery, 2010). The low pass rate on the KASRP made it impossible to conduct further analysis on the dichotomized score. Therefore, inferential analysis was conducted using the mean KASRP score as the dependent variable.

Table 3
KASRP scores when missing responses excluded from the analysis versus missing responses coded as an incorrect response

<table>
<thead>
<tr>
<th>Data Set</th>
<th>N</th>
<th>Mean %</th>
<th>SD</th>
<th>Median</th>
<th>Percentiles (25, 75%)</th>
<th>80 and over n</th>
<th>80 and over %</th>
</tr>
</thead>
<tbody>
<tr>
<td>KASRP (missing excluded)</td>
<td>292</td>
<td>67.3</td>
<td>9.2</td>
<td>68.4</td>
<td>62.0, 73.7</td>
<td>15</td>
<td>5.1</td>
</tr>
<tr>
<td>KASRP (imputed)</td>
<td>336</td>
<td>66.7</td>
<td>9.1</td>
<td>68.4</td>
<td>60.5, 73.7</td>
<td>15</td>
<td>4.5</td>
</tr>
</tbody>
</table>

Figure 2
Histogram showing the distribution of KASRP scores
Figure 3

Boxplot showing the distribution of KASRP scores

KARSP Scores Stratified by School, Site and Program

The mean KASRP scores varied by school and site (Table 4). The highest mean score [SD] was obtained by participants at site 3 (71.0% [6.9]). The lowest mean score [SD] was obtained by participants at site 6 (59.4% [11.1]). There was an overall statistically significant difference between sites (F-test, 14.3, df, 2, p <.001). Statistically significant differences between sites are reported in the footnote of Table 4.
Table 4

KASRP scores for each site

<table>
<thead>
<tr>
<th>Site</th>
<th>N</th>
<th>Mean (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>34</td>
<td>60.9 (8.6)</td>
</tr>
<tr>
<td>2</td>
<td>19</td>
<td>67.3 (7.0)</td>
</tr>
<tr>
<td>3</td>
<td>109</td>
<td>71.0 (6.9)</td>
</tr>
<tr>
<td>4</td>
<td>41</td>
<td>65.5 (10.8)</td>
</tr>
<tr>
<td>5</td>
<td>44</td>
<td>62.5 (8.42)</td>
</tr>
<tr>
<td>6</td>
<td>27</td>
<td>59.4 (11.1)</td>
</tr>
<tr>
<td>7</td>
<td>62</td>
<td>69.0 (6.82)</td>
</tr>
</tbody>
</table>

1 Results are reported by site numbers which include: BScN and PN programs
2 Significant differences exist (t-test; 14.3, df; 2, p < .001) between the following sites: site 1 – site 3 (p < .001), site 1 – site 5 (p < .001), site 2 – site 6 (p = .028), site 3 – site 4 (p = .06), site 3 – site 5 (p < .001), site 3 – site 6 (p < .001), site 5 – site 7 (p = .002), site 6 – site 7 (p < .001).

Table 5 reports the results of bivariate analysis between school and program in relationship to KASRP score. There was a statistically significant difference in mean KASRP scores between participants in the BScN and those in the PN program (t-test; 2.9, p = .004). Participants enrolled in the BScN program had a mean score (SD) of 67.9 (9.4) and participants enrolled in the PN program had a mean score (SD) of 65.0 (8.6), which is a medium effect size (Cohen’s $d$ = .32). There was also a statistically significant difference in mean [SD] KASRP score by the school that the participants attended (School A 71.0 [6.9], vs. School B 64.6 [9.4], p < .001). This difference reflects a large effect size (Cohen’s $d$ = .78). After combining school and program into a three-level variable (School A BScN, School B BScN, School B/PN), the overall ANOVA was statistically significant (F test = 20.5, p < .001). Post Hoc Tukey HSD analysis revealed...
that there was no statistically significant difference in KASRP scores between the BScN and PN programs in School B (BScN 64.0 (10.6) vs PN 65.0 (8.6). However, School A/BScN (71.0 [6.9]) was significantly different from both programs in School B (BScN (p<.001), PN (p<.001).

**Table 5**

*School and program in relationship to mean KASRP scores (n=336)*

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>n</th>
<th>Mean (SD)</th>
<th>Statistic</th>
<th>df*</th>
<th>P value</th>
<th>Cohen’s d or n²</th>
</tr>
</thead>
<tbody>
<tr>
<td>School¹</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>School A</td>
<td>109</td>
<td>71.0 (6.9)</td>
<td>-7.06</td>
<td>279.3</td>
<td>&lt;.001</td>
<td>.78</td>
</tr>
<tr>
<td>School B</td>
<td>227</td>
<td>64.6 (9.4)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Program</td>
<td></td>
<td></td>
<td>2.9</td>
<td>334</td>
<td>.004</td>
<td>.32</td>
</tr>
<tr>
<td>BScN</td>
<td>197</td>
<td>67.9 (9.4)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PN</td>
<td>139</td>
<td>65 (8.6)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>School and Program¹ ²</td>
<td>667</td>
<td>66.7 (9.14)</td>
<td>20.5</td>
<td>2</td>
<td>&lt;.001</td>
<td>.11</td>
</tr>
<tr>
<td>School A – Program 1</td>
<td>109</td>
<td>71.0 (6.9)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>School B – Program 1</td>
<td>87</td>
<td>64.0 (10.6)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>School B – Program 2</td>
<td>140</td>
<td>65.0 (8.6)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*df=Degrees of freedom
¹School A (BScN program) and School B (BScN and PN programs)

The results of the bivariate analysis examining the association between sample characteristics and KASRP score are provided in Table 6. There were significant differences in mean KASRP scores based on primary language. Participants who indicated English was their primary language had a mean score (SD) of 67.4 (8.8) and participants who indicated English was not their primary language had a mean score [SD] of 60.3 ([8.2], t-test; 3.8, p<.001).
There was no statistically significant difference in mean KASRP scores [SD] between participants ≤22 years of age (67.3 [8.7]) and those >22 years (66.7 [9.1], t-test; 0.60, p=.55). Based on Cohen’s $d$ (0.07) this was a small effect size. There was no significant difference in mean KASRP scores [SD] for participants with previous education in healthcare (65.3 [9.7]) as compared to those participants without previous education in healthcare (67.3 [8.8]), t-test; 1.64, p = .103, Cohen’s $d = -0.22$). Nor was there a significant difference in mean KASRP scores [SD] for participants with previous education in pain management (69.1 [9.6]) as compared to those without this education (66.6 [8.9], t-test; -1.49, p = .137, Cohen’s $d = 0.3$). Participants who had cared for a patient experiencing pain had significantly higher mean KASRP scores [SD] (67.2 [8.9]) as compared to those participants who did not have this experience (60.7, 9.3, p = .009, t-test; -2.65, Cohen’s $d = 0.7$).

**Table 6**

_Bivariate analysis of independent variables and KASRP scores_

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>n (%)</th>
<th>Mean (SD)</th>
<th>Statistic</th>
<th>df*</th>
<th>P value</th>
<th>Cohen’s $d$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Language</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>English</td>
<td>309 (92.8)</td>
<td>67.4 (8.8)</td>
<td>3.8</td>
<td>331</td>
<td>&lt;.001</td>
<td>0.83</td>
</tr>
<tr>
<td>non-English</td>
<td>24(7.2)</td>
<td>60.3(8.2)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age (median split)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>22 and below</td>
<td>179 (55%)</td>
<td>67.3(8.7)</td>
<td>.60</td>
<td>326</td>
<td>.548</td>
<td>.07</td>
</tr>
<tr>
<td>23 and above</td>
<td>149(45%)</td>
<td>66.7(9.1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Previous education in healthcare</td>
<td></td>
<td></td>
<td>1.64</td>
<td>325</td>
<td>.103</td>
<td>.22</td>
</tr>
</tbody>
</table>

57
A linear regression was conducted to identify the combination of independent variables that were associated with the dependent variable of KASRP score. The final reduced model is reported in Table 7. Results of the stepped approach to manually removing variables that did not meet the cut off of $p \leq 0.05$ are included in Appendix I. Residual plots (Appendix K) for the dependent variable were assessed to satisfy the assumption of homoscedasticity (approximately equal variability). Only language, school attended and previous experience caring for someone with pain remained in the final multiple linear regression model. The participants’ primary language was the strongest predictor of KASRP score. Participants who spoke English as their primary language scored 6.4% higher on the KASRP as compared to those who did not report English as their primary language, while holding school and pain care experience constant.

To demonstrate these findings at an individual level, a participant who reports English as their primary language, attends School A and has previously cared for someone in pain
would have an estimated mark of 78.6% (Y(mark)=60.5(intercept) + 5.9*1(School A) + 6.4*1(English) + 5.8*1 (cared) = 78.6%). A participant with a primary language other than English, from School B and with no previous experience caring for someone in pain before, would have an estimated mark would be 60.5% (Y(mark)=60.5(intercept) + 0*1(School A) + 0*1 (English) + 0*1 (cared) = 60.5%). Language, school attended and previous pain care experience explained 16.0% of the variation in KASRP score ($r^2$). This proposes that 84.0% of the variance in KASRP scores is not explained by the variables in the model. The overall model was significant (p<.001).

**Table 7**

*Multiple linear regression of independent variables and KASRP scores- final reduced model*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient $\beta$</th>
<th>Std. Error</th>
<th>Std. Coefficient $\beta$</th>
<th>t</th>
<th>Sig</th>
<th>95% C.I.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>60.5</td>
<td>3.3</td>
<td></td>
<td>18.3</td>
<td>.00</td>
<td>53.9 to 66.9</td>
</tr>
<tr>
<td>Schoola</td>
<td>5.9</td>
<td>1.0</td>
<td>.31</td>
<td>6.0</td>
<td>.00</td>
<td>4.0 to 7.9</td>
</tr>
<tr>
<td>Languageb</td>
<td>6.4</td>
<td>1.8</td>
<td>1.9</td>
<td>3.6</td>
<td>.00</td>
<td>2.9 to 9.9</td>
</tr>
<tr>
<td>Cared for someone in pain beforec</td>
<td>5.8</td>
<td>2.3</td>
<td>.13</td>
<td>2.5</td>
<td>.01</td>
<td>1.3 to 10.3d</td>
</tr>
<tr>
<td>R</td>
<td>.40</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$R^2$</td>
<td>.16</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sum of Squares</td>
<td>4082.6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>df</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean Square</td>
<td>1360.9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>19.7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sig</td>
<td>p&lt;.001</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a: School reference category = School B
b: Language reference category = non-English
c: Previous experience caring for someone with pain reference category= no experience caring for someone in pain
Table 8 reveals the number and percentage of participants who responded to the question “Do you feel your program has provided you with adequate pain and pain management education?” at both the beginning and end of the KASRP. Students who reported they were adequately prepared before they completed the KASRP tended to have higher mean KASRP scores (67.1 - 67.8%) than those who felt they were not adequately prepared before completing the KASRP (62.0 - 65.0%). However, due to small cell frequencies there was no statistically significant difference between mean KASRP score across the levels of perception of adequacy of pain education.

**Table 8**

*Participants’ perception of their preparation in pain and pain management education*

<table>
<thead>
<tr>
<th>Independent Variable</th>
<th>n (%)</th>
<th>Mean (SD)</th>
<th>Statistical test</th>
<th>df*</th>
<th>P value</th>
<th>Cohen’s d (r)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perception of whether participants feel their program has prepared them with adequate pain education</td>
<td>328 (97.6%)</td>
<td>65.0 (10.4)</td>
<td>2.2</td>
<td>3</td>
<td>.088</td>
<td>0.02</td>
</tr>
<tr>
<td>Q1 No / Q2 No</td>
<td>59 (18.0%)</td>
<td>65.0 (10.4)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q1 No / Q2 Yes</td>
<td>7 (2.1%)</td>
<td>62.0 (8.6)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q1 Yes / Q2 No</td>
<td>85 (25.9%)</td>
<td>67.1 (8.2)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q1 Yes / Q2 Yes</td>
<td>177 (54.0%)</td>
<td>67.8 (8.9)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*df= Degrees of freedom*
**Strengths and Weaknesses in Pain Knowledge and Attitudes**

The following calculations were conducted for each question of the KASRP: the number of participants who responded to each question; the number of correct responses; the valid percentage correct (excluded participants with missing KASRP answers); and the imputed percentage correct (included participants with missing KASRP responses marked as an incorrect answer) (Appendix J). Certain questions were consistently answered incorrectly or correctly by most participants. Table 9 includes the questions where 40% or fewer of participants answered the question correctly and Table 10 includes the questions where at least 90% of participants answered the question correctly.

The questions were identified based on the percent correct for the total sample, and then the percent correct was stratified by school. Over 90% of participants responded correctly to questions about who is the best judge of an individual’s pain, the reliability of self-report of pain in children, and symptoms of withdrawal from opioid medications. Major gaps in knowledge involved deducing the percentage of the population affected by respiratory depression after receiving an opioid, dosage calculations, medication administration and pharmacology.

**Table 9**

*KASRP questions identifying major gaps in pain knowledge and attitudes in final year students (≤40% answered correctly)*

<table>
<thead>
<tr>
<th>Question</th>
<th>All Participants (%)</th>
<th>School A (%)</th>
<th>School B (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>#27. A patient with persistent cancer pain has been receiving daily opioid analgesics for 2 months. Yesterday the patient</td>
<td>9.5</td>
<td>7.3</td>
<td>10.6</td>
</tr>
</tbody>
</table>

61
was receiving morphine 200 mg/hour intravenously. Today he has been receiving 250 mg/hour intravenously. The likelihood of the patient developing clinically significant respiratory depression in the absence of new comorbidity is: a. less than 1%, b. 1-10%, c. 11-20%, d. 21-40%. (Correct answer = a)

#22. The recommended route of administration of opioid analgesics for patients with persistent cancer-related pain is: a. intravenous, b. intramuscular, c. subcutaneous, d. oral, e. rectal. (Correct answer = d).

#36.2 Andrew. Your assessment, above is made two hours after he received morphine 2 mg IV. Half hourly pain ratings following the injection ranged from 6 to 8 and he had no clinically significant respiratory depression, sedation, or other untoward side effects. He has identified 2/10 as an acceptable level of pain relief. His physician’s order for analgesia is “morphine IV 1-3 mg q1h PRN pain relief.” Check the action you will take at this time: a. administer no morphine at this time, b. administer morphine 1 mg IV now, c. administer morphine 2 mg IV now, d. administer morphine 3 mg IV now”. (Correct answer = d).

#9. The usual duration of analgesia of 1-2 mg morphine IV is 4-5 hours (correct answer = false)

#35. Following abrupt discontinuation of an opioid, physical dependence is manifested by the following:
   a. sweating, yawning, diarrhea and agitation with patients when the opioid is abruptly discontinued
   b. Impaired control over drug use, compulsive use, and
craving

c. The need for higher doses to achieve the same effect.
d. a and b (Correct answer = a)

#25. Which of the following IV doses of morphine administered over a 4-hour period would be equivalent to 30 mg of oral morphine given q 4 hours? (correct answer = b)
   a. Morphine 5 mg IV
   b. Morphine 10 mg IV
   c. Morphine 30 mg IV
   d. Morphine 60 mg IV

#37.2 Robert. Your assessment, above, is made two hours after he received morphine 2 mg IV. Half hourly pain ratings following the injection ranged from 6 to 8 and he had no clinically significant respiratory depression, sedation, or other untoward side effects. He has identified 2/10 as an acceptable level of pain relief. His physician’s order for analgesia is “morphine IV 1-3 mg q1h PRN pain relief.” Check the action you will take at this time:
   a. Administer no morphine at this time.
   b. Administer morphine 1 mg IV now.
   c. Administer morphine 2 mg IV now.
   d. Administer morphine 3 mg IV (Correct answer = d)

#32. How likely is it that patients who develop pain already have an alcohol and/or drug abuse problem?
< 1%  5 – 15%  25 - 50%  75 -100% (Correct answer = 5-15%)
#7. Respiratory depression rarely occurs in patients who have been receiving stable doses of opioids over a period of months (Correct answer = true)

#20. Benzodiazepines are not effective pain relievers unless the pain is due to muscle spasm (Correct answer = true)

#11. Morphine has a dose ceiling (i.e. a dose above which no greater pain relief can be obtained) (Correct answer = false)

Table 10

KASRP questions identifying major strengths in pain knowledge and attitudes in final year students (≥90% answered correctly)

<table>
<thead>
<tr>
<th>Question</th>
<th>All Participants (%)</th>
<th>School A (%)</th>
<th>School B (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>#30. The most accurate judge of the intensity of the patient’s pain is: a. the treating physician, b. the patient’s primary nurse, c. the patient, d. the pharmacist, e. the patient’s spouse or family”. (Correct answer = c)</td>
<td>98.5</td>
<td>99.1</td>
<td>98.2</td>
</tr>
<tr>
<td>#14. Children less than 11 years old cannot reliably report pain so clinicians should rely solely on the parent’s assessment of the child’s pain intensity. True or False. (Correct answer = false)</td>
<td>98.2</td>
<td>100.0</td>
<td>97.4</td>
</tr>
<tr>
<td>#21. Narcotic/opioid addiction is defined as a chronic neurobiological disease, characterized by behaviors that include one or more of the following: impaired control over</td>
<td>97.3</td>
<td>97.2</td>
<td>97.4</td>
</tr>
</tbody>
</table>
drug use, compulsive use, continued use despite harm, and craving. True or False. (Correct answer = true)

#13. Patients should be encouraged to endure as much pain as possible before using an opioid. True or False. (Correct answer = false)

#12. Elderly patients cannot tolerate opioids for pain relief (Correct answer = false)

#28. The most likely reason a patient with pain would request increased doses of pain medication is:
   a. The patient is experiencing increased pain.
   b. The patient is experiencing increased anxiety or depression.
   c. The patient is requesting more staff attention.
   d. The patient’s requests are related to addiction (Correct answer = a)

#15. Patients’ spiritual beliefs may lead them to think pain and suffering are necessary (Correct answer = true)

#16. After an initial dose of opioid analgesic is given, subsequent doses should be adjusted in accordance with the individual patient’s response (Correct answer = true)

#31. Which of the following describes the best approach for cultural considerations in caring for patients in pain:
   a. There are no longer cultural influences in Canada due to the diversity of the population.
   b. Cultural influences can be determined by an individual’s
ethnicity (e.g., Asians are stoic, Italians are expressive, etc.).
c. Patients should be individually assessed to determine
cultural influences.
d. Cultural influences can be determined by an individual’s
socioeconomic status (e.g., blue collar workers report more
pain than white collar workers) (Correct answer = c)

#36.1 Circle the number that represents your assessment of
Robert’s pain: 0-10 Likert Scale (Correct answer = 8)
Chapter 5

Discussion

This research study investigated knowledge and attitudes toward pain of final year nursing students in BScN and PN programs at two schools in three cities in southeastern Ontario, Canada. This chapter is organized in the following way: discussion of key findings in comparison to current evidence; application of findings to the Critical Thinking Framework, strengths and limitations of the study; clinical and academic implications; and future research directions.

Discussion of Key Findings

KASRP knowledge and attitudes scores revealed that the majority of participants do not have adequate knowledge about and attitudes toward pain. Only 4.5% of participants demonstrated adequate knowledge and attitudes about pain as measured by their KASRP score, using the recommended 80% and above as a passing score (McCaffery & Robinson, 2002). English as a primary language, attending School A and previous experience caring for someone in pain were revealed to be significantly related to an increase in mean KASRP scores (p<.001). Participants in School A (BScN program) reported significantly higher mean KASRP scores than participants in School B (BScN and PN programs) (p<.05). Areas where the majority of participants had weak knowledge included, identifying the percentage of the population at risk of respiratory depression after receiving opioid therapy, medication dosage calculations, understanding pharmacology and medication administration. Areas where almost all students had solid knowledge and attitudes about pain included questions about who is the best judge of an
individual’s pain, the reliability of self-report of pain in children, and symptoms of withdrawal from opioid medications.

**Comparison of Key Findings with Current Evidence**

While the overall “pass rate” was low in the current study, the mean KASRP scores were higher (66.7%) than reports from other studies of nursing students. Mean scores from international studies using the KASRP included: U.S.A. (64%); Jordan (34.1%, 40.0%); Iran (37.0%); Hong Kong (year 1 students, 52.4%; year 3, 53.5%) and Taiwan (55%). (Al-Khawaldeh, Al-Hussami & Darawad, 2013; Al Khalileh & Al Qadire, 2013; Chan & Hamamura, 2016; Chiang, Chen & Huang, 2006; Plaisance & Logan, 2006; Rahimi-Madiseh, Tavakol & Dennick, 2010). Two studies in the U.S.A. reported scores slightly higher than the 66.7% in this study. In a study amongst senior year nursing students, the mean KASRP score was 67.7% (Duke, Haas, Yarbrough & Northam, 2013). In another study, which used questions from the KASRP and open ended questions to test junior year nursing students’ knowledge and attitudes towards pain after a pain simulation education program, the mean KASRP score was 70.4% (Evans & Mixon, 2015). There were no studies that have used the KASRP tool to report the knowledge and attitudes of nursing students in Canada.

The findings of the current study are also supported by findings from both quantitative and qualitative studies conducted in the U.S.A., England, France, New Zealand, Jordan and Canada that used alternate methods to assess knowledge and attitudes regarding pain amongst nursing students. Quantitative studies used measurement tools, such as the Pediatric Nurses Knowledge and Attitudes Survey Regarding Pain, Nurses’ Attitude Survey, Pain Management Principles Assessment Test, Pain Knowledge Questionnaire
and Clinical Decision-Making Questionnaire for Pain Management, U.K. Pain Questionnaire, Survey of Knowledge and Beliefs Regarding Pain, Pain Knowledge and Beliefs Questionnaire. Results from the use of these instruments consistently reported nursing students had inadequate knowledge and/or attitudes about pain (Al Qadire, 2014; Arber, 2001; Briggs, Carr & Whittaker, 2011; Brockcopp, Ryan & Warden, 2003; Hunter et al., 2008; Latchman, 2014; Lebovits, et al., 1997; Ortiz et al., 2015; Sheehan, Webb, Bower & Einsporn, 1992; Watt-Watson, 2004). Studies that incorporated case vignettes, semi-structured interviews and unpublished tools also reported inadequate pain knowledge and attitudes (Briggs, 2010; Chiu, Trinca, Lim & Tuazon, 2002; Diekmann & Wassem, 1991; Gillmore & Hill, 1981; Hadjistavropoulos et al., 2015; Igier, Mullet & Sorum, 2006; Lasch et al., 2002; Mackintosh-Franklin, 2014; Shaw & Lee, 2010; Watt-Watson, 1987).

Greenberger and colleagues (2006) used a modified version of the KASRP along with questions added requesting information about students’ past or present personal or familial experiences with pain, frequency of professional care provided and perceptions of success in professional pain care. The author found that knowledge and attitude levels amongst nursing students were positively correlated with how frequently they were willing to provide pain care (p<.001), yet knowledge and attitudes were negatively correlated to their own perceptions of their success in pain care (p<.001). This is supported by the current study in that students with experience caring for someone in pain were most likely to receive a higher score on the KASRP. Future work in this area could address how students perceive their ability to provide acceptable pain management to patients.
Few studies have addressed factors that may contribute to inadequate knowledge and attitudes about pain, however there is evidence from one study that nursing faculty may also lack adequate pain management knowledge. A study by Duke, Haas, Yabrough and Northam (2013) found that nursing faculty scored only slightly higher on the KASRP (mean = 71%) than senior nursing students (mean = 68%) in the same study.

As discussed in the literature review section, approaches to improving knowledge and attitudes have been successful. Four studies, conducted in the U.S.A, England and Asia, found improvements in students’ knowledge and attitudes after educational interventions focused on pain and its’ management (Chiang, Chen & Huang, 2006; Evans & Mixon, 2015; Goodrich, 2006; Owens, Smith & Jonas, 2014). Evans and Mixon (2015) used a pain simulation program with fear of addiction identified as a barrier to pain management and a core learning objective during the program. The simulation involved a patient that was post-operative day one after undergoing a painful spinal surgery. Planned events during the simulation involved: pain assessment and measurement, pain interventions and a biological, psychological and social phenomenon. To make the simulation more realistic, fear of addiction was included in the scenario. Students were briefed at the beginning of the simulation experience and those with active roles in the simulation (some were observers) were instructed to conduct an initial assessment on the mannequin and subsequently provide interventions. Findings from the results of the students’ analyses revealed inadequate pain control by the students. However, after the use of the intervention, students KASRP scores were noted to be slightly higher.

The study conducted in Taiwan reported that mean KASRP scores increased from 55.0% before to 91.4% after taking part in a pain education program. The four-hour
program was used to train nursing students in pediatric pain management. The program involved didactic teaching and interactive discussions of case scenarios given. The program mainly focused on: misconceptions about pediatric pain; pain assessment tools for the pediatric population; pediatric pharmacological and non-pharmacological interventions for pediatric pain (Chiang, Chen & Huang, 2006).

Owens, Smith and Jonas (2014) utilized three, three-hour workshops delivered by a pain nurse. The focus of the workshops was: pediatric acute and continued care, and vital skills. More specifically, the content of the workshops involved topics such as: theoretical viewpoints concerning to the concept of pain; pain physiology; pain assessment; guidelines; best practice and pharmacological interventions, students were split into two groups and the groups received the same workshops, but at different points in their education, and the intervention group received the workshops in year two of their program. The comparison group received the program in year three of their studies. The students who received the education in year two of their studies received slightly higher scores than those in year three.

The fourth study that used an interventional design was conducted using pre-existing curriculum where students were surveyed at the beginning and end of a semester (Goodrich, 2006). In general, all four of these studies experienced some improvement in pain management knowledge and attitudes after interventions were in place.

The current study is consistent with the body of evidence suggesting inadequate knowledge and attitudes amongst nursing students. However, the current study also adds new knowledge. For example, the higher scores in this study compared to international estimates, may be related to the tool being developed in an English-speaking “western”
culture and may not be sensitive to pain experiences and attitudes in other cultures. There are no reports of the KASRP being tested in other cultures. It was developed in the United States which may be more similar to Canadian culture than other cultures where low scores have been reported. Culture is known to have an effect on how pain is perceived and how it is managed and treated (Campbell & Edwards, 2012). Language may also affect KASRP scores. In the current study, the KASRP was administered in English. Participants with English as a first language had significantly higher scores than students speaking other languages, yet they come from the same educational programs offered in English. This supports the theory that language may impact on the interpretability of the tool. The KASRP has been used in many other cultures however there is no evidence of cultural testing. The KASRP has been translated into Greek, Italian, Spanish, and Turkish (Platko, 2013).

In the current study, BScN participants were in four-year university degree programs and PN participants were in a two-year college diploma program. Plaisance and Logan (2006) reported that students in four-year baccalaureate nursing programs had significantly higher KASRP scores than did students in two-year associate degree programs. Given having past experience caring for someone in pain significantly improved KASRP scores in this study, and if it is assumed that being in a four-year program increases the likelihood of having cared for patients with pain, one would expect higher scores in the four-year programs. However, in this study participants in one of the four-year degree programs scored significantly lower than students in the other four-year program, but not significantly different from the scores in the two-year diploma program.
This implies that in this study, how well a participant scored on the KASRP was not related to the length or type of program but to the educational institution they attended.

Students who reported previous experience caring for someone in pain had significantly higher KASRP scores ($p \leq 0.01$). However, it is not clear how students gained this experience, as the term ‘previous experience caring for someone in pain’ was not defined in the current study. As mentioned above, studies by McCaffery and Robinson (2002) and Reiman and Gordon (2007), report that years of professional experience affects pain knowledge and attitudes amongst nurses, however years of professional experience was not defined by the authors.

In the current study, participants were asked to reflect on the adequacy of their pain knowledge and attitudes. Raines (2010) found self-reflective practice amongst students to be important as it is thought to mirror nursing students’ current clinical capability, and self-reflective practice can lead to improved clinical self-assurance. Students’ perceptions of confidence and adequacy when first employed is thought to rely on how well they have learned cognitive, technical and non-technical skills directly related to patient care, before graduation from their nursing education program (Kim, 2007). However, in the current study there was no significant relationship between participants’ perceived adequacy of preparation in pain management and KASRP scores. This may be due to the relatively low scores achieved by most study participants. If scores were higher, this may have improved participants’ confidence in their knowledge and therefore increased the likelihood of a relationship between feeling adequately prepared and having high KASRP scores.
This study found that students had difficulty identifying populations at risk of developing respiratory depression after receiving opioid therapy, conducting dosage calculations, understanding pharmacology of drugs and administering medication. This is consistent with the findings from several other KASRP-based studies that found that students had incorrect responses to questions on these topics. Evans and Mixon (2015) reported that students did poorly when choosing between several options for pro-re nata (PRN) opioid medications on the KASRP. Al-Khawaldeh, Al-Hussami and Darawad (2013) reported that only 31.7% of students in Jordan disagreed with the statement that patients should be encouraged to endure as much pain as possible prior to opioid use. Attitudes about, and skills in, pain assessment may contribute to why students answer questions regarding PRN medication administration incorrectly, as they may feel patients need to be displaying physical signs of pain prior to administration of more medication. This is supported by findings in the case vignettes in the current study where participants indicated they would give less medication to a patient who smiles when reporting a pain score of 8/10 than a patient reporting the same pain score while grimacing.

Areas where participants as a group demonstrated high levels of pain knowledge and attitudes included knowing who the best judge is of patients’ pain, understanding pain physiology, and questions about pain in subpopulations. This could suggest that students may have strong theoretical knowledgeable about general pain concepts, even in subpopulations such as the elderly and children, but they do not apply this knowledge adequately to practice situations.
Results in the context of the Critical Thinking Framework

The Critical Thinking Framework (Edwards, 2007), establishes that nursing students’ knowledge is first obtained (phase one) and then defended (phase two). Phase one of the Framework is the phase of gathering and sorting information and making an informed decision. Phase two involves defending the decisions that were made, reflecting on the process and evaluating what has been done. In the current study, the KASRP was used as a means of assessing students’ abilities to make informed decisions and defend their knowledge and attitudes about pain (phase two). Only 4.5% of the students displayed optimal pain knowledge and attitudes as indicated through achievement of a KASRP score of 80% or higher. Therefore, according to the Critical Thinking Framework, more needs to be done during phase one to assist students in attaining adequate subjective and objective knowledge related to pain, so that adequate knowledge and attitudes develop within this population. This is essential to undergraduate nursing education as nurses acquire their foundational knowledge, attitudes and skills and translate this into nursing practice during the time of nursing education (Clark, 2004). Through interactions with other students, patients, and educators, students continue to learn about pain (Ferguson & Day, 2005; Gelder, Lopez-Ibor & Andreason, 2003; Liaschenko & Peter, 2004; Lindeman, 2000).

Strengths and Limitations

This study has several strengths: 1) The data was readily attainable because the sample was drawn from local institutions, and students were recruited and completed questionnaires in the classroom setting; this contributed to a high participation rate, thereby making the findings generalizable to nursing students at these two schools; 2)
Results from this study can help in guiding curricula at the classroom, program and school level in the region; 3) The results can be used as a basis for generating and testing interventions to improve students’ pain knowledge; 4) This study assessed the knowledge of both degree and diploma prepared nursing students, which may promote further analysis of the nursing educational system; 5) The unique finding that school, more than program, influenced knowledge and attitude is a new finding and requires further analysis of the curricula of these programs; and 6) A valid and reliable data collection tool was available and reported in several other studies allowing for comparison of results with students in other countries.

This study also has several limitations: 1) The sampling frame was limited to two schools and the curricular content of the programs was not assessed therefore the appropriateness of the KASRP questions relative to the curricular content is not known, and the results cannot be generalized beyond these two schools; 2) Some questions related to pain medications and their administration were not answered by some students. Duke, Haas, Yarbrough and Northam (2013) suggest that missing responses might be an indication of inadequate knowledge and/or misconceptions. Kiekkas et al. (2015) attempted to avoid this problem by providing an ‘unsure’ option for each question. This allowed students the opportunity to not guess responses to questions about which they were not confident. However, in the current study missing entries were recoded as incorrect responses because it is general practice in the classroom setting to assign zero when a question is not answered; 3) There is a possibility that students were affected by a social desirability bias and gave answers that they felt would be desired by the researcher. However, if they answered correctly this is a sign that they have adequate knowledge; 4)
The finding that only 4.5% of participants passed the KASRP could not be compared to other studies as only one study reported the percentage of students who received 80% and above on the KASRP, which is how the KASRP designers intended results to be disseminated. Given the mean scores from other studies were reported to be generally lower in the literature in comparison with the current study, it is possible that very few, if any participants in other studies achieved a score of 80% or higher. 5) Only a limited review of the KASRP was conducted by clinical experts in the current study.

**Clinical and Academic Implications**

Pain is a symptom experienced by everyone at some point in their life. Current evidence from varied geographical locations cite low KASRP scores and the current study further confirmed this finding. This study is consistent with other studies using the KASRP, where the need for additional education in the areas of identifying populations at risk of developing respiratory depression after receiving opioid therapy, conducting dosage calculations, understanding pharmacology of drugs and administering medication. It has been established that those attending School B had a lower KASRP score than those attending School A, however both schools had inadequate mean KASRP scores. It is important that nursing education involve appropriate and adequate pain content so that nursing students have the opportunity to develop appropriate pain assessment and management knowledge and attitudes. This knowledge is imperative to the nursing role, as nurses educate and care for patients with pain. It is recommended that the KASRP be used as part of a guideline when reviewing or planning curriculum to support students in what they are taught and what will be expected of them once they enter clinical practice. The KASRP could also be used as an assessment tool within educational programs to
evaluate students’ uptake of appropriate knowledge and the ability to apply this knowledge to practice. Nursing curricula could be improved through the application of additional attention to areas in which the students show weakness.

The current study was conducted at only two schools and therefore replication at additional schools is required in other settings. Given that the case scenarios were among the questions answered poorly by students, it may be necessary for further consideration to be given to whether or not students are able to apply the knowledge they have learned to the examples given in the KASRP. Scenarios more relevant for students versus practicing clinicians may be required.

It was also found that those who spoke English as their primary language performed significantly better on the KASRP. If primary language is a reasonable proxy for primary culture, this could be due to a lack of cultural sensitivity of the KASRP. Alternatively, since the KASRP was administered in English, performance by students without English as their primary language may be negatively influenced by their English competency.

**Future Research**

It is important to expand this research to other regions (provincial and national) to avoid making recommendations based on two schools in Ontario, which may not represent other sites. A longitudinal design could help determine how and when pain knowledge and attitudes are acquired and how they advance within this population. This information will be important when trying to identify the type and timing of educational components. Future longitudinal studies are also needed to test the effect of educational interventions. As a continuation to the work of Greenberger et al. (2006), it may be
important to ask students about how they perceive their own ability to provide adequate pain care to patients and correlate this to their KASRP scores.

It is necessary to determine the knowledge and attitudes of newly registered nurses to compare results and determine if performance improves over time spent in clinical practice. Current evidence suggests that professional experience results in higher KASRP scores and therefore understanding if clinical practice plays a role in improving pain assessment knowledge and attitudes is important. Participants in the current study were given an opportunity to be contacted in three years for follow-up investigation and comparison. This may create an opportunity for development of some of this additional evidence.

A review of the KASRP tool to determine if it requires revisions or updates is needed, especially before using it as a tool to adjust or measure curriculum changes. A full review of the KASRP by clinical experts is also recommended. It is also appropriate to continue the work of other authors who used the KASRP as a tool to measure knowledge and attitudes prior to and after educational interventions. Testing the KASRP tool for cultural sensitivity is an important next step given the results of the current study and the lack of this testing otherwise. Further ideas for future studies include testing knowledge and attitudes of faculty members toward pain. This study also needs to be conducted at other sites to determine its generalizability across/within Ontario and Canada.

Conclusion

In conclusion, pain management falls within the scope of nursing practice and this study is consistent with other reports indicating that the majority of nursing students do not have adequate knowledge and attitudes about pain. Without a proper understanding of
pain and its management, nursing students may not contribute to their full scope of practice in the management of pain. This study suggests that many nursing students may be leaving their nursing programs and entering practice with inadequate pain knowledge and attitudes and this may contribute to poor pain management and high levels of moderate to severe acute and chronic pain. Further work is required in order to generalize these findings to other sites in Ontario, Canada and to gain further understanding of where specific gaps in knowledge and attitudes exist so appropriate interventions can be developed and tested. Nursing educators may find this information useful when planning curricula for future students. Additionally, this information may be useful for educators when planning clinical opportunities for students to acquire appropriate pain knowledge and attitudes, with the goals of improving nursing practice, and enhancing patient care.
**References**


Briggs, C. L. (2010). What were they thinking? Nursing students' thought processes underlying pain management decisions. *Nursing Education Perspectives, 31*(2), 84-88.


Clark, C. L. (2004). The professional socialization of graduating students in generic and two-plus-two baccalaureate completion nursing programs. *Journal of Nursing Education, 43*(8), 346-351.


McCaffery, M. & Robinson, E.S. (2002). Your patient is in pain – here’s how you respond. *Nursing, 32*(10); 36-45


*Anesthesiology, 93*, 1123-1133.


Appendix A
Critical Thinking Framework

The framework consists of two overlapping phases one leading into another:
- **Phase 1** looks at choosing one alternative over another and considering what actions to follow.
- **Phase 2** is about justification and taking responsibility for the decision, the solution may encourage new policies or procedures.

**Phase 1**
- Interpretation and organisation of the information
- Hidden assumptions
- Breakdown the situation / information into parts
- Consider all of the options
- Nursing knowledge involved (both subjective & objective)
- Are there any conflicting issues?
- Consider all of the options, again!
- A decision has to be made.

**Phase 2**
- Defending the decision
- Accountability & Responsibility for the decision made
- Evaluation of the process
- Creativity and innovation

The arrows indicate two inter-linking phases and once completed can lead back to Phase 1. The framework is not static or a structured process but is flexible and dynamic.

Edwards, 2007
Appendix B

Search Strategy

- Search terms: ‘nursing students’ and ‘pain’

- Psyc INFO (N=221) → EMBASE (N=175) → MEDLINE (N=156) → CINAHL (N=173)

- Duplicates removed (N=556)

- Titles/abstracts screened (exclusion criteria: deviation from topic of study as an outcome measure, non-English articles and non-nursing student samples) (N=169)

- Total (N=28) → Reference list of literature review: 3 additional articles were added to be reviewed

- Total (N=28)
Appendix C

Literature Review Table

<table>
<thead>
<tr>
<th>Reference</th>
<th>Region</th>
<th>Country</th>
<th>Instrument</th>
<th>Study Design</th>
<th>Sample</th>
<th>Sampling Method</th>
<th>Findings</th>
<th>Limitations</th>
</tr>
</thead>
</table>
| Evans & Mixon (2015) | North America | United States | KASRP      | Descriptive, cross-sectional | 117 second semester junior year nursing students | Convenience | Mean KASRP score of 70.4%. Students were asked to reflect on simulation as a means of education about pain, and the authors note that some reported that they learned from it and others felt negatively about it. The authors note that students scored higher than anticipated on the KASRP item regarding addiction and scored lowest on the KASRP question regarding choosing a correct PRN medication (the authors do not specify which questions they are referring to). | • Simulation is not a true clinical environment  
  • Students may not internalize communication skills practiced in a simulation scenario because communication with the manikin may make them uncomfortable |
| Duke, Haas, Yarbrough & Northam (2013) | North America | United States | KASRP      | Descriptive, cross-sectional | 162 baccalaureate nursing students and 16 nursing faculty members | Convenience | KASRP scores were as follows: first-semester junior students achieved a mean score of 59.7%, second-semester junior students had a mean score of 61.2%, first-semester senior students received a mean score of 67.6% and nursing faculty members achieved a mean KASRP score of 71.0%. Questions regarding knowledge of medications were missed most frequently by participants and the case studies (involving pain reporting and medication administration) were done poorly by most students and faculty struggled with the administration of pain medication. The authors of this study suggest that although it is possible that knowledge involving medications improves with experience in a clinical environment, results also reveal a deficit in what is being taught and/or retained by both faculty and students | • Convenience sampling limits generalizability  
  • Use of a self-report measure |
| Chan & Hamamura, (2016) | Asia           | Hong Kong  | KASRP      | Descriptive, cross-sectional | 104 students enrolled in a 3-year master’s degree program (pre- | Convenience | Mean KASRP scores for year 1 students was 52.4% and for year 3 students was 53.5%. Suboptimal pain knowledge and attitudes and little difference between the two groups. Three questions with the lowest correct response rate regarded the KASRP case scenarios and the two patients who had abdominal surgery. | • Self-report measures  
  • No assessment of previous training or experience with pain management  
  • Cross-sectional design  
  • Participants were from one nursing school |
<table>
<thead>
<tr>
<th>Study Authors &amp; Year</th>
<th>Region</th>
<th>Country</th>
<th>Instrument</th>
<th>Study Design</th>
<th>Sample Size</th>
<th>Results</th>
<th>Limitations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Al-Khawaldeh, Al-Hussami &amp; Darawad (2013)</td>
<td>Asia</td>
<td>Jordan</td>
<td>KASRP</td>
<td>Descriptive, cross-sectional</td>
<td>240 final year baccalaureate nursing students</td>
<td>Convenience</td>
<td>The mean correct score of the entire survey was 34.1%. This study demonstrated a low level of understanding amongst nursing students about pain management.</td>
</tr>
<tr>
<td>Al Khalaileh and Al Qadire (2013)</td>
<td>Asia</td>
<td>Jordan</td>
<td>KASRP</td>
<td>Descriptive, cross-sectional</td>
<td>144 final year nursing students enrolled in governmental universities</td>
<td>Convenience</td>
<td>The mean KASRP score was reported to be 16 (SD=5.1) out of 40, which translates to 40%. The authors report that students had the most difficulty correctly answering questions relating to pharmacology</td>
</tr>
<tr>
<td>Greenberger, Reches &amp; Riba (2006)</td>
<td>Asia</td>
<td>Israel</td>
<td>KASRP and Patient Pain Questionnaire (PPQ)</td>
<td>Descriptive, cross-sectional</td>
<td>565 first and fourth year baccalaureate nursing students</td>
<td>Convenience sampling</td>
<td>Results revealed that educational level was the strongest influencer of knowledge and attitudes amongst nursing students and nurses seeking certification. The authors used a different scoring system, and did not report the KASRP scores individually. Instead they chose to combine the results of both surveys and give a score between one and seven. First year students scored a 3.7, fourth year students scored a 4.86 (an increase of 19.3%), beginner certification nurses received a score of 5.07, and nurses completing certification received a score of 5.18. The authors also noted that age, gender, religious faith and marital status were correlated with the knowledge and attitude levels of the participants. The authors note that significant increases in knowledge and attitudes developed by the fourth year of students' education. There is no mention of areas that are in specific need of improvement</td>
</tr>
<tr>
<td>Rahimi-Madiseh, Tavakol &amp; Dennick (2010)</td>
<td>Asia</td>
<td>Iran</td>
<td>KASRP</td>
<td>Descriptive, cross-sectional</td>
<td>146 Nursing students (semester 4 and above)</td>
<td>Convenience</td>
<td>Results revealed a mean score of 37% correct, with no students scoring higher than 60%. Students did poorly on the case scenarios involving the administration of PRN medications</td>
</tr>
<tr>
<td>Author(s)</td>
<td>Region</td>
<td>Country</td>
<td>Study Design</td>
<td>Sample Size</td>
<td>Sampling Method</td>
<td>Results</td>
<td>Limitations</td>
</tr>
<tr>
<td>------------------------------</td>
<td>------------</td>
<td>---------------</td>
<td>-----------------------</td>
<td>-------------</td>
<td>--------------------------</td>
<td>-------------------------------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Plaisance &amp; Logan (2006)</td>
<td>North America</td>
<td>United States</td>
<td>Cross-sectional</td>
<td>313 nursing students (baccalaureate and associate degree)</td>
<td>Random sampling</td>
<td>The mean correct score for all students was reported to be 64%. Baccalaureate students scored significantly higher at 65.0% than those in associate programs, with a mean correct score of 60.8%. Students answered questions regarding pharmacology and side effects of narcotic medications were answered incorrectly by many respondents</td>
<td>Cross-sectional design • Data collected in one location</td>
</tr>
<tr>
<td>Chiang, Chen &amp; Huang (2006)</td>
<td>Asia</td>
<td>Taiwan</td>
<td>Quasi-experimental</td>
<td>192 Nursing students</td>
<td>Convenience sampling</td>
<td>Results revealed significantly higher scores on the KASRP after the education program (91.4%) versus before (55.0%). Prior to the pain education program, 73.37% indicated they were fairly confident at assessing and managing children’s pain, this increased significantly to 87.07% after the education program. Results showed that pharmacology was an area in need of improvement amongst participants, however the authors found that this knowledge did not increase after the education program</td>
<td>Convenience sampling limits generalizability • Conducted in only one nursing school • Behavior change not measured • Translation into Chinese</td>
</tr>
<tr>
<td>Goodrich (2006)</td>
<td>North America</td>
<td>United States</td>
<td>Descriptive, longitudinal</td>
<td>Authors do not report a sample size</td>
<td>Convenience sampling</td>
<td>Although mean KASRP scores are not reported by the author, areas of strength and weakness are identified. In general, senior students performed better than junior students, and junior students performed better than soft more students. It was also noted that student scores improved the longer they were in the program. Many students correctly identified that patients, not clinicians, rate their own pain intensity best. However, gaps in understanding were shown to be evident in the areas of: pain experienced during sleep, and believing patients’ self-reports of pain, incidence of respiratory depression, equi-analgesic conversions, use of placebos, use of promethazine as a potentiatior of opioid analgesics and the definitions of addiction, tolerance and physical dependence. Both faculty and students alike lacked knowledge in the area of ceiling effects of opioids and differentiating addiction from tolerance and physical dependence</td>
<td>No report of sample size • No report of actual scores • Conducted in only one setting</td>
</tr>
</tbody>
</table>

Educational Intervention Studies using the KASRP
<table>
<thead>
<tr>
<th>Authors</th>
<th>Country</th>
<th>Region</th>
<th>Tools</th>
<th>Study Type</th>
<th>Sample Size</th>
<th>Sampling Method</th>
<th>Findings</th>
<th>Limitations</th>
</tr>
</thead>
</table>
| Owens, Smith & Jonas (2014)     | United Kingdom| England       | KASRP                                      | Cross-sectional, comparative | 127 nursing students                 | Convenience sampling            | The authors noted that those in the intervention group had slightly better scores after the workshop. Those in the intervention group had increased knowledge levels related to pathophysiology, pharmacology and pain management after taking workshop. The authors do not explain modifications made to the KASRP, they also do not report overall mean scores for before and after the workshop, nor do they report significance levels. | Modifications to KASRP are not made explicit  
Small sample size  
No report of overall mean scores or significance levels  
Convenience sampling limits generalizability |
| Various tools                    |               |               |                                             |                     |                                      |                                 |                                                                         |                                                                            |
| Ortiz et al. (2015)              | North America | Mexico        | Pediatric Nurses Knowledge and Attitudes Survey Regarding Pain (PNKASRP) | Descriptive, cross-sectional | 111 hospital pediatric nurses and 300 nursing students (year of study is not reported) | Convenience Sampling             | Final scores on the PNKASRP revealed that pediatric nurses had an average score of 40.1% (SD=7.9), whereas nursing students scored 40.3% (SD=7.5). Respiratory depression with the use of opioids, narcotic addiction, PRN administration, route of administration and pain over reporting statistics were the topic areas that students answered most poorly in | Convenience sample limits generalizability  
Modified KASRP  
Cross-sectional design |
| Latchman (2014)                  | North America | United States | The Nurses' Attitude Survey (NAS) and the Pain Management Principles Assessment Test (PMPAT) | Descriptive, cross-sectional | Final year baccalaureate nursing students (n=41) | Convenience sampling            | The mean score of the PMPAT was 63%--which is considered sub-adequate, areas of concern surrounded pain medication pharmacology, suitable time to treat pain, the use of cutaneous stimulations as a measure of pain relief, and complete pain relief as the foremost aim of pain management practices. In terms of attitudes, the majority of students agreed that distraction can reduce a patients’ pain level, little expression of pain does indicate the absence of pain, and continual assessment is essential for suitable pain management. | Cross-sectional design  
One location  
Lack of representation from other ethnicities (only had Caucasian participants)  
Convenience sample limits generalizability |
<p>| Brockcopp, Ryan &amp; Warden (2003)  | North America | United States | Pain Knowledge Questionnaire (PKQ) and Clinical Decision-Making Questionnaire for Pain Management (CDMQP) | Descriptive, exploratory study | 157 nurses (64 critical care nurses, 27 medical-surgical nurses and 66 new graduate nurses) and 265 nursing students (100 second-year students, 85 third-year students, 80 fourth-year students) | Convenience sampling            | Results revealed that the overall response concerning cancer patients was positive and regarding substance abusers was negative. Medical-surgical nurses were reported to be the most conservative in their willingness to spend time and energy managing the pain of all patient groups. Nursing students were the second most conservative, followed by critical care nurses, and new graduates were reported to be the most willing to spend time and energy on pain management. All groups scored 80% or higher in the area of pain knowledge, however individual scores were not reported for each group. | Convenience sampling limits generalizability |</p>
<table>
<thead>
<tr>
<th>Authors</th>
<th>Region</th>
<th>Country</th>
<th>Questionnaire/Instrument</th>
<th>Study Design</th>
<th>Sample Size</th>
<th>Purposeful/Purpose</th>
<th>Findings</th>
<th>Limitations/Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Briggs, Carr and Whittaker (2011)</td>
<td>United Kingdom</td>
<td>Unspecified</td>
<td>U.K. Pain Education Questionnaire</td>
<td>Descriptive, cross-sectional design</td>
<td>74 Universities</td>
<td>Purposeful</td>
<td>Average identifiable pain content of undergraduate curricula was 12.0 hours, although the range was reported to be two to 158 hours. Authors also found: interprofessional education regarding pain was rare amongst schools included in the study. International Association for the Study of Pain (IASP) curricula recommendations had been fully implemented in only four faculties. Many faculties had not integrated the curricula (40.1%) or had partially done so (41.7%).</td>
<td>The survey was limited to 11 university regions. Dependant on the responses of informants at each individual school. No insight given as to the effectiveness of the pain curricula.</td>
</tr>
<tr>
<td>Al Qadire (2014)</td>
<td>Asia</td>
<td>Jordan</td>
<td>Palliative Care Quiz for Nursing (PCQN)</td>
<td>Descriptive, cross-sectional</td>
<td>220 Nursing students (2nd–4th year)</td>
<td>Convenience</td>
<td>The authors report a mean score of 40%, stating that students held a number of misconceptions about palliative care, such as: associating the severity and extent of a disease with the selection of pain treatments, and, students believed that emotional detachment is a prerequisite for the provision of palliative care services. Authors believe that this lack of knowledge is related to a lack of palliative care education in current nursing curriculum.</td>
<td>Convenience sampling limits generalizability. Students were required to have access to internet access and Facebook accounts to access the online questionnaire. The English version of the questionnaire was used and this could have hindered proper interpretation of the questions.</td>
</tr>
<tr>
<td>Arber (2001)</td>
<td>United Kingdom</td>
<td>England</td>
<td>Palliative Care Quiz for Nursing (PCQN)</td>
<td>Pre-test, Post-test design</td>
<td>33 Undergraduate nursing students</td>
<td>Convenience sampling</td>
<td>The PCQN was administered before and after a palliative care module to measure a change in score based on taking the module. Authors found a significant increase in PCQN scores after taking the module. Deficits in knowledge involved the side effects of codeine, the need for sedation, and the use of placebos. At the end of the survey, the results of the quiz were discussed with students in order to clarify items that were done incorrectly.</td>
<td>The authors did not report an overall percentage or score for the group. The authors did not report what year the undergraduate nursing students were in. Convenience sampling limits generalizability.</td>
</tr>
<tr>
<td>Lebovits et al. (1997)</td>
<td>North America</td>
<td>United States</td>
<td>Questions taken from: the KASRP, Cancer Pain Knowledge Questionnaire (CPKQ), Survey of Knowledge and Beliefs Regarding Pain (SKBRP)</td>
<td>Descriptive, cross-sectional</td>
<td>A combination of nurses, physicians, pharmacists, and medical/nursing students from three hospitals (large city hospital, private community hospital and a Confinement)</td>
<td>Convenience Sampling</td>
<td>An overall mean correct score of 56% was calculated for all participants. Physicians scored significantly higher, and pharmacists scored significantly lower than other groups. Students were reported to have not differed from other groups involved in the study. Significant knowledge deficits about current pain management standards of practice as well as beliefs which interfere with optimal care, elicit a need for educational intervention.</td>
<td>Convenience sample limits generalizability. Analysis proves difficult due to the creation of a new instrument based on other instruments.</td>
</tr>
<tr>
<td>Study</td>
<td>Region</td>
<td>Country</td>
<td>Instrument</td>
<td>Design</td>
<td>Sampling Method</td>
<td>Details</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------------------------------</td>
<td>----------------------</td>
<td>--------------</td>
<td>-------------</td>
<td>-----------------------------</td>
<td>-----------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sheehan, Webb, Bower &amp; Einsporn (1992)</td>
<td>North America</td>
<td>United States</td>
<td>CPKQ</td>
<td>Descriptive, cross-sectional</td>
<td>Final year nursing students (n=82)</td>
<td>Programs were randomly selected but students were recruited by convenience sampling. Analysis revealed a mean score of 49%. Knowledge deficits amongst participants appeared in the following areas: underestimated the possible effectiveness of treatment (73%), believed that maximum analgesic therapy should be given to patients with a prognosis of less than 12 months (29%), believed that increasing cancer pain is related to tolerance rather than progression of disease (55%), believed that the preferred route of administration is intravenous rather than oral (58%), believed that the level of respiratory depression (not constipation) would not lessen with repeated opioid administration (37%).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Watt-Watson (2004)</td>
<td>North America</td>
<td>Toronto, Canada</td>
<td>PKBQ</td>
<td>Descriptive, cross-sectional</td>
<td>540 second-entry nursing students</td>
<td>Concurrency sampling. There was a statistically significant improvement in overall mean scores post (83%) intervention versus before the intervention (66%) (p&lt;.001). The DCFQ was used to assess process and content. A high percentage of students (74% to 92%) ranked their satisfaction as exceeding or meeting their expectations.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hunter (2008)</td>
<td>North America</td>
<td>Canada</td>
<td>PKBQ and DCPQ</td>
<td>Longitudinal</td>
<td>817</td>
<td>Concurrency sampling. Each year there was a significant (p&lt;.001) difference between pre and post PKBQ scores (14% to 17% improvement). The DCPQ was used to give students an opportunity to provide feedback on the curriculum content and the process. Results suggest that 85-95% of students rated aspects of the workshop highly.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Developed by the Authors</td>
<td>North America</td>
<td>Canada</td>
<td>Developed by the authors, involved Likert scales</td>
<td>Observation</td>
<td>Students, including senior nursing students (enrolled in third or fourth year), along with medical, kinesiology</td>
<td>Convenience sampling. Results showed that students rated their knowledge of pain management significantly higher after the IPE workshop. Students rated their greatest satisfaction with the client presentations and their lowest satisfaction with keynote speakers. The students also valued interrelating and talking with students from other professions and learned from client presentations.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Cross-sectional design
- Convenience sample limits generalizability
and health studies, pharmacy, physical therapy, social work and psychology students (n=73).

**Gillmore & Hill (1981)**  
North America  
United States  
Developed by the authors  
Descriptive, Exploratory  
96 nursing students, describing half of the participants as “beginners” and half as “advanced”  
Convenience sampling  
This study’s results revealed that the key factor that influenced the students’ evaluation of the patient’s complaint of pain was diagnostic ambiguity. Students felt that patients with ambiguous diagnoses had less severe, less genuine pain. Students were not affected by patients that were “more attractive” in terms of reacting to their pain.

**Chiu, Trinca, Lim & Tuazon (2002)**  
Asia and Austrailia  
Philippine s and Austrailia  
Developed by the authors  
Descriptive, cross-sectional  
150 nursing students (81 Australian, 69 Philippines)  
Convenience sampling  
Results revealed sub-adequate scores (mean= 38.6%), with knowledge deficits reported to be in the areas of pharmacology and differences between acute and chronic pain. Most students described their pain education as minimal.

**Diekmann & Wassem, 1991**  
North America  
United States  
Developed by the authors  
Exploratory, descriptive  
938 nursing students (465 associate degree program; 466 baccalaureate nursing program)  
Convenience sampling  
Results revealed that 83 (9%) of the respondents indicated that pain should be endured without medication. Approximately one-third of the sample indicated that pain is not better managed when analgesics are given around the clock compared with as needed.

**Watt-Watson (1987)**  
North America  
Canada  
Developed by the authors  
Descriptive, cross-sectional  
Graduate nurses (n=106) Third year baccalaureate nursing students (n=101)  
Convenience sampling  
Watt-Watson (1987) reported an overall mean score of 52% (SD±14), but does not report how the questionnaire was scored. Graduates of a baccalaureate nursing program had the highest mean score of 59% (SD±15), diploma nursing program graduates had a mean score of 55% (SD±13), third year BScN students had a mean score of 54% (SD±15) and second year BScN students had the lowest scores with a mean of 44% (SD±13). Watt-Watson reported low levels of knowledge about the duration and mechanism of action of narcotic medications.

- Convenience sampling limits generalizability of findings  
- Author-developed tool  
- Data was collected from one state and may not be generalized to other locations  
- Non-respondent schools may have differed from schools that did respond  
- Convenience sampling limits generalizability  
- Watt-Watson does not report how the questionnaire was scored  
- Convenience sampling limits generalizability  
- Data was collected from one location  
- Use of an unpublished tool  
- Older study
<table>
<thead>
<tr>
<th>Study Details</th>
<th>Country</th>
<th>Region</th>
<th>Research Design/Methodology</th>
<th>Sample Description</th>
<th>Findings/Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Igier, Mullet, and Sorum (2006)</td>
<td>Europe</td>
<td>France</td>
<td>Cross-sectional, descriptive</td>
<td>Nurses, nursing students and nurse’s aides (n=214) were recruited by convenience sampling and were presented with 48 case vignettes describing an elderly patient suffering from osteoarthritis.</td>
<td>Results revealed that the three most important factors in judging pain amongst participants were: difficulty in making social contact with the patient, the patient’s avoidance of changing position, and the avoidance of movements. All participants rated each reported sign of the patients’ pain to the level of pain they thought that the patient was experiencing.</td>
</tr>
<tr>
<td>Briggs (2010)</td>
<td>North America</td>
<td>United States</td>
<td>Case vignette Descriptive, cross-sectional</td>
<td>270 Junior and senior nursing students</td>
<td>Analysis of the data revealed that more than half of the students were able to assess pain properly. It is important to make the distinction that there is a marked difference between proper assessment of pain and the proper treatment or management (i.e. adequate amounts of analgesics). Qualitative data from this study revealed inaccurate knowledge and beliefs regarding pain management. The importance of assessing knowledge, attitudes and misconceptions is addressed as an important practice when attempting to understand the under-treatment of pain.</td>
</tr>
<tr>
<td>Shaw &amp; Lee (2010)</td>
<td>Oceania</td>
<td>New Zealand</td>
<td>Specially designed survey that included vignettes</td>
<td>430 Nursing students (across three years of undergraduate education)</td>
<td>Students who participated in this study demonstrated that they held a considerable degree of misconceptions about patients with chronic non-malignant pain. Misconceptions most commonly held involved the following topic areas: tolerance to pain, psychological impairment, stress, compensation and exaggeration, manipulative behavior, depression, addition to opioids, compliance and dependence. It was also noted that as students progressed through their education, they held misconceptions to a slightly lesser degree.</td>
</tr>
<tr>
<td>Semi-Structured Interviews</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---------------------------</td>
<td>------------------</td>
<td>-----------------</td>
<td>----------------</td>
<td>----------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>Mackintosh -Franklin (2014)</td>
<td>Europe</td>
<td>England</td>
<td>2 semi-structured interviews (1st interview after two clinical placements, and 2nd interview after three additional placements</td>
<td>Qualitative, longitudinal, time sensitive design</td>
<td>16 Nursing students</td>
</tr>
<tr>
<td>Lasch et al. (2002)</td>
<td>North America</td>
<td>United States</td>
<td>Semi-structured interviews and focus groups</td>
<td>Qualitative, exploratory</td>
<td>Medical and nursing students, and faculty (n=72)</td>
</tr>
</tbody>
</table>
Appendix D
Knowledge and Attitudes Survey Regarding Pain

1. Do you feel your program has provided you with adequate pain and pain management education? Yes ☐ No ☐ Comments ____________________________________________

True/False – Circle the correct answer

T F 2. Vital signs are always reliable indicators of the intensity of a patient’s pain.

T F 3. Because their nervous system is underdeveloped, children under two years of age have decreased pain sensitivity and limited memory of painful experiences.

T F 4. Patients who can be distracted from pain usually do not have severe pain.

T F 5. Patients may sleep in spite of severe pain.

T F 6. Aspirin and other non-steroidal anti-inflammatory agents are NOT effective analgesics for painful bone metastases.

T F 7. Respiratory depression rarely occurs in patients who have been receiving stable doses of opioids over a period of months.

T F 8. Combining analgesics that work by different mechanisms (e.g., combining an NSAID with an opioid) may result in better pain control with fewer side effects than using a single analgesic agent.

T F 9. The usual duration of analgesia of 1-2 mg morphine IV is 4-5 hours.

T F 10. Opioids should not be used in patients with a history of substance abuse.

T F 11. Morphine has a dose ceiling (i.e. a dose above which no greater pain relief can be obtained)

T F 12. Elderly patients cannot tolerate opioids for pain relief.

T F 13. Patients should be encouraged to endure as much pain as possible before using an opioid.

T F 14. Children less than 11 years old cannot reliably report pain so clinicians should rely solely on the parent’s assessment of the child’s pain intensity.

T F 15. Patients’ spiritual beliefs may lead them to think pain and suffering are necessary.

T F 16. After an initial dose of opioid analgesic is given, subsequent doses should be adjusted in accordance with the individual patient’s response.
T F 17. Giving patients sterile water by injection (placebo) is a useful test to determine if the pain is real.

T F 18. If the source of the patient’s pain is unknown, opioids should not be used during the pain evaluation period, as this could mask the ability to correctly diagnose the cause of pain.

T F 19. Anticonvulsant drugs such as gabapentin (Neurontin) produce optimal pain relief after a single dose.

T F 20. Benzodiazepines are not effective pain relievers unless the pain is due to muscle spasm.

T F 21. Narcotic/opioid addiction is defined as a chronic neurobiologic disease, characterized by behaviors that include one or more of the following: impaired control over drug use, compulsive use, continued use despite harm, and craving.

Multiple Choice – Place a check by the correct answer

22. The recommended route of administration of opioid analgesics for patients with persistent cancer-related pain is ________
   a. intravenous
   b. intramuscular
   c. subcutaneous
   d. oral
   e. rectal

23. The recommended route administration of opioid analgesics for patients with brief, severe pain of sudden onset such as trauma or postoperative pain is ______
   a. intravenous
   b. intramuscular
   c. subcutaneous
   d. oral
   e. rectal

24. Which of the following analgesic medications is considered the drug of choice for the treatment of prolonged moderate to severe pain for cancer patients?
   a. codeine
   b. morphine
   c. meperidine
   d. tramadol

25. Which of the following IV doses of morphine administered over a 4 hour period would be equivalent to 30 mg of oral morphine given q 4 hours?
   a. Morphine 5 mg IV
   b. Morphine 10 mg IV
   c. Morphine 30 mg IV
   d. Morphine 60 mg IV

26. Analgesics for post-operative pain should initially be given
27. A patient with persistent cancer pain has been receiving daily opioid analgesics for 2 months. Yesterday the patient was receiving morphine 200 mg/hour intravenously. Today he has been receiving 250 mg/hour intravenously. The likelihood of the patient developing clinically significant respiratory depression in the absence of new comorbidity is

a. less than 1%
b. 1-10%
c. 11-20%
d. 21-40%
e. > 41%

28. The most likely reason a patient with pain would request increased doses of pain medication is

a. The patient is experiencing increased pain.
b. The patient is experiencing increased anxiety or depression.
c. The patient is requesting more staff attention.
d. The patient’s requests are related to addiction.

d. The patient’s requests are related to addiction.

29. Which of the following is useful for treatment of cancer pain?

a. Ibuprofen (Motrin)
b. Hydromorphone (Dilaudid)
c. Gabapentin (Neurontin)
d. All of the above

c. Gabapentin (Neurontin)

d. All of the above

30. The most accurate judge of the intensity of the patient’s pain is

a. the treating physician
b. the patient’s primary nurse
c. the patient
d. the pharmacist
e. the patient’s spouse or family

c. the patient

e. the patient’s spouse or family

31. Which of the following describes the best approach for cultural considerations in caring for patients in pain:

a. There are no longer cultural influences in Canada due to the diversity of the population.
b. Cultural influences can be determined by an individual’s ethnicity (e.g., Asians are stoic, Italians are expressive, etc).
c. Patients should be individually assessed to determine cultural influences.
d. Cultural influences can be determined by an individual’s socioeconomic status (e.g., blue collar workers report more pain than white collar workers).

c. Patients should be individually assessed to determine cultural influences.

d. Cultural influences can be determined by an individual’s socioeconomic status (e.g., blue collar workers report more pain than white collar workers).

32. How likely is it that patients who develop pain already have an alcohol and/or drug abuse problem?

< 1% 5 – 15% 25 - 50% 75 - 100%
< 1% 5 – 15% 25 - 50% 75 - 100%

33. The time to peak effect for morphine given IV is

a. 15 min.
34. The time to peak effect for morphine given orally is
   a. 5 min.
   b. 30 min.
   c. 1 – 2 hours
   d. 3 hours

35. Following abrupt discontinuation of an opioid, physical dependence is manifested by the following:
   a. sweating, yawning, diarrhea and agitation with patients when the opioid is abruptly discontinued
   b. Impaired control over drug use, compulsive use, and craving
   c. The need for higher doses to achieve the same effect.
   d. a and b

Case Studies
Two patient case studies are presented. For each patient you are asked to make decisions about pain and medication.
Directions: Please select one answer for each question.

36. Patient A: Andrew is 25 years old and this is his first day following abdominal surgery. As you enter his room, he smiles at you and continues talking and joking with his visitor. Your assessment reveals the following information: BP = 120/80; HR = 80; R = 18; on a scale of 0 to 10 (0 = no pain/discomfort, 10 = worst pain/discomfort) he rates his pain as 8.

A. On the patient’s record you must mark his pain on the scale below. Circle the number that represents your assessment of Andrew’s pain.

   0 1 2 3 4 5 6 7 8 9 10

B. Your assessment, above, is made two hours after he received morphine 2 mg IV. Half hourly pain ratings following the injection ranged from 6 to 8 and he had no clinically significant respiratory depression, sedation, or other untoward side effects. He has identified 2/10 as an acceptable level of pain relief. His physician’s order for analgesia is “morphine IV 1-3 mg q1h PRN pain relief.” Check the action you will take at this time.

1. Administer no morphine at this time.
2. Administer morphine 1 mg IV now.
3. Administer morphine 2 mg IV now.
4. Administer morphine 3 mg IV now.

37. Patient B: Robert is 25 years old and this is his first day following abdominal surgery. As you enter his room, he is lying quietly in bed and grimaces as he turns in bed. Your assessment reveals the following information: BP = 120/80; HR = 80; R = 18; on a scale of 0 to 10 (0 = no pain/discomfort, 10 = worst pain/discomfort) he rates his pain as 8.
A. On the patient’s record you must mark his pain on the scale below. Circle the number that represents your assessment of Robert’s pain:

0 1 2 3 4 5 6 7 8 9 10

---------------------------------------------------------------------------------------------
No pain/discomfort  Worst pain/discomfort

B. Your assessment, above, is made two hours after he received morphine 2 mg IV. Half hourly pain ratings following the injection ranged from 6 to 8 and he had no clinically significant respiratory depression, sedation, or other untoward side effects. He has identified 2/10 as an acceptable level of pain relief. His physician’s order for analgesia is “morphine IV 1-3 mg q1h PRN pain relief.” Check the action you will take at this time:

1. Administer no morphine at this time.
2. Administer morphine 1 mg IV now.
3. Administer morphine 2 mg IV now.
4. Administer morphine 3 mg IV

38. Do you feel your program has provided you with adequate pain and pain management education? Yes ☐ No ☐ Comments ________________________________
Appendix E

Author Permission Letter

April 2008

Dear Colleague:

The “Knowledge and Attitudes Survey Regarding Pain” tool can be used to assess nurses and other professionals in your setting and as a pre and post test evaluation measure for educational programs. The tool was developed in 1987 and has been used extensively from 1987 - present. The tool was revised and is now being tested in pain education courses to conduct psychometric analysis on this updated version. There have been minor edits in April 2008.

Regarding issues of reliability and validity: This tool has been developed over several years. Content validity has been established by review of pain experts. The content of the tool is derived from current standards of pain management such as the American Pain Society, the World Health Organization, and the Agency for Health Care Policy and Research. Construct validity has been established by comparing scores of nurses at various levels of expertise such as students, new graduates, oncology nurses, graduate students, and senior pain experts. The tool was identified as discriminating between levels of expertise. Test-retest reliability was established (r>.80) by repeat testing in a continuing education class of staff nurses (N=60). Internal consistency reliability was established (alpha r>.70) with items reflecting both knowledge and attitude domains.

Regarding analysis of data: We have found that it is most helpful to avoid distinguishing items as measuring either knowledge or attitudes. Many items such as one measuring the incidence of addiction really measures both knowledge and attitude about addiction. Therefore, we have found the most benefit to be gained from analyzing the data in terms of the percentage of complete scores as well as in analyzing individual items. For example, we have found it very helpful to isolate those items with the least number of correct responses and those items with the best scores.

Enclosed for your use is a copy of our instrument and an answer key. You may use and duplicate the tool for any purpose you desire in whole or in part. References to some of our studies which have included this tool or similar versions are included below.

We also acknowledge the assistance of several of our pain colleagues including Pam Kedziera, Judy Paice, Deb Gordon, June Dahl, Hob Osterlund, Chris Pasero, Pat Coyne and Nessa Coyle in the current revisions. If using or publishing the tool results please cite the reference as “Knowledge and Attitudes Survey Regarding Pain” developed by Betty Ferrell, RN, PhD, FAAN and Margo McCaffery, RN, MS, FAAN, (http://prc.coh.org), revised 2008.

We hope that our tool will be a useful aid in your efforts to improve pain management in your setting.

Sincerely,

Betty R. Ferrell, RN, PhD, FAAN
Research Scientist

Margo McCaffery, RN, MS, FAAN
Lecturer and Consultant
Appendix F
KASRP Alterations

<table>
<thead>
<tr>
<th>Question</th>
<th>Action</th>
<th>Reasoning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Research shows that promethazine (Phenergan) and hydroxyzine (Vistaril)</td>
<td>Question has been removed</td>
<td>Promethazine (Phenergan) is not available in Canada and there are no known substitutions* Hydroxyzine is available as Atarax in Canada*</td>
</tr>
<tr>
<td>(Vistaril) are reliable potentiators of opioid analgesics</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vicodin (hydrocodone 5 mg + acetaminophen 500 mg) PO is approximately</td>
<td>Question has been removed</td>
<td>Vicodin is not available in Canada and there are no known substitutions*</td>
</tr>
<tr>
<td>equal to 5-10 mg of morphine PO</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Which of the following describes the best approach for cultural</td>
<td>Question has been changed to:</td>
<td>Cultural influences in the U.S. are not appropriate for Canadian settings</td>
</tr>
<tr>
<td>considerations in caring for patients in pain:</td>
<td>Which of the following describes the best approach for cultural considerations in caring for patients in pain:</td>
<td></td>
</tr>
<tr>
<td>a. There are no longer cultural influences in the U.S. due to the</td>
<td>a. There are no longer cultural influences in Canada due to the diversity of the population</td>
<td></td>
</tr>
<tr>
<td>diversity of the population</td>
<td>b. Cultural influences can be determined by an individual’s ethnicity (e.g. Asians are stoic, Italians are expressive, etc.)</td>
<td></td>
</tr>
<tr>
<td>b. Cultural influences can be determined by an individual’s ethnicity</td>
<td>c. Patients should be individually assessed to determine cultural influences</td>
<td></td>
</tr>
<tr>
<td>(e.g. Asians are stoic, Italians are expressive, etc.)</td>
<td>d. Cultural influences can be determined by an individual’s socioeconomic status (e.g. blue collar workers report more pain than white collar workers)</td>
<td></td>
</tr>
<tr>
<td>c. Patients should be individually assessed to determine cultural</td>
<td></td>
<td></td>
</tr>
<tr>
<td>influences</td>
<td></td>
<td></td>
</tr>
<tr>
<td>d. Cultural influences can be determined by an individual’s</td>
<td></td>
<td></td>
</tr>
<tr>
<td>socioeconomic status (e.g. blue collar workers report more pain than</td>
<td></td>
<td></td>
</tr>
<tr>
<td>white collar workers)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Information on proper medication substitutions was given from a pharmacological expert
Appendix G

Demographics and Information Sheet

Age_____

First language:   English ☐   French ☐   Other _________

Will you graduate in 2016?   Yes ☐   No ☐

If you answered no to the above question, do not continue filling out the survey. Please return the survey package to the researcher

Which nursing program are you enrolled in: BScN ☐   PN ☐

Previous education/accreditation in healthcare? Yes ☐   No ☐

If so, please explain _________

Previous education in pain management? Yes ☐   No ☐

If so, please explain _________

Have you cared for someone in pain before? Yes ☐   No ☐

Can the researcher contact you in three years time as part of a follow up to this study?

Yes ☐   No ☐

If so, please provide the following information:

Name: ________________________________

Phone number: _________________________

Email address: __________________________

Thank you
Appendix H

Consent Form

Informed consent version 1.0  Revised: August 10th, 2015

Title of Study: Nursing students’ knowledge and attitudes towards pain management
You are being invited to participate in a study being conducted by Jennifer Hroch, RN BScN with guidance provided by supervisors: Dr. Elizabeth VanDenKerkhof and Dr. Mona Sawhney. This study has been approved for ethical compliance by the Queen’s University Health Sciences & Affiliated Teaching Hospitals Research Ethics Board.

Background: The purpose of this study is to examine the knowledge and attitudes of pain management in undergraduate nursing students in all years of study.

Details of the Study: If you agree to participate in this study, you will be asked to complete a Demographics and History sheet as well as a survey titled, Knowledge and Attitudes Towards Pain Management. The survey will take 15-30 minutes to complete.

Risks/benefits: There are no risks associated with your involvement in this study. Your involvement may help others because it could lead to advancements in pain management practices or education.

Freedom to Withdraw: Your involvement in this study is entirely voluntary. However, if you agree to participate, you have the right at any time to withdraw from this study without any consequence.

Confidentiality: Your contribution to this study will be confidential and all information will be kept confidential. The survey will have your name removed from it and will be labeled with an arbitrary study identification number to maintain confidentiality. The results of the study may be used for scientific publication but you will not be identified.

SUBJECT STATEMENT AND SIGNATURE SECTION
If you have any questions during the study, you can contact Jennifer Hroch at 613-876-1873. If you have any questions or concerns about your rights as a research participant, you can contact Dr. A. Clark, Chair, Queen’s University Research Ethics Board, email: clarkaf@queensu.ca.

I have read and understand the consent form for this study. I have been given adequate time to contemplate the above material and to seek appropriate advice. I have been able to ask questions, and if asked, they have been answered to my satisfaction. I am willingly signing this form.

By signing this consent form, I am indicating that I agree to participate in this study.

Name______________________ Signature____________________________

Date_______________________
Signature of person conducting consent:

Name ___________________ Signature ____________________________

Date ____________________

Investigator:

I, or an assigned individual, have sensibly explained to the subject the nature of the above research study. I certify that, to the best of my knowledge, the subject understands clearly the nature of the study and the demands, benefits, and risks involved to participants in this study.

____________________________  __________________
Signature of Principal Investigator  Date
### Appendix I

#### Linear Regression Steps

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>Std. Coefficient</th>
<th>t</th>
<th>Sig</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>54.6</td>
<td>5.2</td>
<td>10.54</td>
<td>.000</td>
<td>44.4 to 64.8</td>
<td></td>
</tr>
<tr>
<td>School</td>
<td>6.211</td>
<td>1.282</td>
<td>0.325</td>
<td>4.844</td>
<td>.000</td>
<td>3.7 to 8.7</td>
</tr>
<tr>
<td>Language*</td>
<td>6.559</td>
<td>2.004</td>
<td>-0.177</td>
<td>-3.273</td>
<td>.001</td>
<td>2.6 to 10.5</td>
</tr>
<tr>
<td>Cared for someone in pain before</td>
<td>6.837</td>
<td>2.483</td>
<td>0.149</td>
<td>2.753</td>
<td>.006</td>
<td>2.0 to 11.7</td>
</tr>
<tr>
<td>Adequacy change</td>
<td>0.69</td>
<td>0.441</td>
<td>0.084</td>
<td>1.554</td>
<td>.121</td>
<td>-0.2 to 1.6</td>
</tr>
<tr>
<td>Education in pain management</td>
<td>1.973</td>
<td>1.711</td>
<td>0.063</td>
<td>1.153</td>
<td>.250</td>
<td>-1.4 to 5.3</td>
</tr>
<tr>
<td>Age</td>
<td>0.071</td>
<td>0.084</td>
<td>0.048</td>
<td>0.847</td>
<td>.398</td>
<td>-0.094 to 0.24</td>
</tr>
<tr>
<td>Education in healthcare</td>
<td>-0.656</td>
<td>1.255</td>
<td>-0.030</td>
<td>-0.052</td>
<td>.601</td>
<td>-3.13 to 1.81</td>
</tr>
<tr>
<td>Nursing program</td>
<td>0.570</td>
<td>1.216</td>
<td>0.031</td>
<td>0.47</td>
<td>.639</td>
<td>-1.82 to 2.97</td>
</tr>
</tbody>
</table>

R = 0.412

R² = 0.170

Sum of Squares = 4140.4

df = 8

Mean Square = 517.6

F = 7.580

Sig = 0.001

*English or non-English
<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>Std. Coefficient</th>
<th>t</th>
<th>Sig</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>55.9</td>
<td>4.4</td>
<td></td>
<td>12.7</td>
<td>.001</td>
<td>47.3 to 64.5</td>
</tr>
<tr>
<td>School</td>
<td>5.882</td>
<td>1.072</td>
<td>0.307</td>
<td>5.487</td>
<td>.001</td>
<td>3.8 to 8.0</td>
</tr>
<tr>
<td>Language*</td>
<td>6.699</td>
<td>1.978</td>
<td>-0.181</td>
<td>-3.386</td>
<td>.001</td>
<td>2.8 to 10.6</td>
</tr>
<tr>
<td>Cared for someone in pain before</td>
<td>6.730</td>
<td>2.470</td>
<td>0.146</td>
<td>2.725</td>
<td>.007</td>
<td>1.87 to 11.6</td>
</tr>
<tr>
<td>Adequacy change</td>
<td>0.714</td>
<td>0.436</td>
<td>0.088</td>
<td>1.636</td>
<td>.103</td>
<td>-0.145 to 1.6</td>
</tr>
<tr>
<td>Education in pain management</td>
<td>1.947</td>
<td>1.70</td>
<td>0.062</td>
<td>1.140</td>
<td>.255</td>
<td>-1.41 to 5.3</td>
</tr>
<tr>
<td>Age</td>
<td>0.075</td>
<td>0.083</td>
<td>0.051</td>
<td>0.907</td>
<td>.365</td>
<td>-0.08 to 0.24</td>
</tr>
<tr>
<td>Education in healthcare</td>
<td>-0.617</td>
<td>1.250</td>
<td>-0.028</td>
<td>-0.494</td>
<td>.622</td>
<td>-3.1 to 1.8</td>
</tr>
<tr>
<td>R</td>
<td>.412</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R²</td>
<td>.169</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sum of Squares</td>
<td>4125.4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>df</td>
<td>7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean Square</td>
<td>589.34</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>8.654</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sig</td>
<td>.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*English or non-English
a: Variable(s) removed: Nursing Program
<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>Std. Coefficient</th>
<th>t</th>
<th>Sig</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>55.87</td>
<td>4.4</td>
<td></td>
<td>12.84</td>
<td>.000</td>
<td>47.3 to 64.4</td>
</tr>
<tr>
<td>School</td>
<td>5.984</td>
<td>1.045</td>
<td>0.313</td>
<td>5.724</td>
<td>.000</td>
<td>3.9 to 8.0</td>
</tr>
<tr>
<td>Language*</td>
<td>6.757</td>
<td>1.966</td>
<td>-0.183</td>
<td>-3.437</td>
<td>.001</td>
<td>2.9 to 10.6</td>
</tr>
<tr>
<td>Cared for someone in pain before</td>
<td>6.612</td>
<td>2.445</td>
<td>0.144</td>
<td>2.704</td>
<td>.007</td>
<td>1.8 to 11.4</td>
</tr>
<tr>
<td>Adequacy change</td>
<td>0.751</td>
<td>0.428</td>
<td>0.093</td>
<td>1.757</td>
<td>.080</td>
<td>-0.9 to 1.6</td>
</tr>
<tr>
<td>Education in pain management</td>
<td>1.793</td>
<td>1.672</td>
<td>0.05</td>
<td>1.072</td>
<td>.284</td>
<td>-1.5 to 5.1</td>
</tr>
<tr>
<td>Age</td>
<td>0.068</td>
<td>0.081</td>
<td>0.046</td>
<td>0.841</td>
<td>.401</td>
<td>-0.09 to 0.23</td>
</tr>
</tbody>
</table>

\( R^2 = 0.17 \)

Sum of Squares 4122.7

\( df = 6 \)

Mean Square 687.1

\( F = 10.2 \)

Sig \( .001 \)

*English or non-English

a: Variable(s) removed: Nursing Program and Education in Healthcare
<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>Std. Coefficient</th>
<th>t</th>
<th>Sig</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>58.06</td>
<td>3.57</td>
<td></td>
<td>16.26</td>
<td>.00</td>
<td>51.03 to 65.08</td>
</tr>
<tr>
<td>School</td>
<td>5.99</td>
<td>1.01</td>
<td>0.31</td>
<td>5.94</td>
<td>.00</td>
<td>4.01 to 7.98</td>
</tr>
<tr>
<td>Language*</td>
<td>6.49</td>
<td>1.82</td>
<td>-0.19</td>
<td>-3.56</td>
<td>.00</td>
<td>2.91 to 10.08</td>
</tr>
<tr>
<td>Cared for someone in pain before</td>
<td>5.70</td>
<td>2.25</td>
<td>0.13</td>
<td>2.53</td>
<td>.01</td>
<td>1.27 to 10.12</td>
</tr>
<tr>
<td>Adequacy change</td>
<td>0.75</td>
<td>0.42</td>
<td>0.09</td>
<td>1.78</td>
<td>.08</td>
<td>-0.08 to 1.57</td>
</tr>
<tr>
<td>Education in pain management</td>
<td>1.82</td>
<td>1.67</td>
<td>0.06</td>
<td>1.09</td>
<td>.27</td>
<td>-1.46 to 5.10a</td>
</tr>
</tbody>
</table>

R = 0.42
R² = 0.18
Sum of Squares = 4471.89
df = 5
Mean Square = 894.38
F = 13.27
Sig = .001

*English or non-English

a: Variable(s) removed: Nursing Program, Education in Healthcare and Age
<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>Std. Error</th>
<th>Std. Coefficient</th>
<th>t</th>
<th>Sig</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept</td>
<td>58.27</td>
<td>3.56</td>
<td></td>
<td>16.41</td>
<td>.00</td>
<td>51.28 to 65.25</td>
</tr>
<tr>
<td>School</td>
<td>6.13</td>
<td>0.99</td>
<td>0.32</td>
<td>6.21</td>
<td>.00</td>
<td>4.19 to 8.08</td>
</tr>
<tr>
<td>Language*</td>
<td>6.55</td>
<td>1.82</td>
<td>-0.19</td>
<td>-3.61</td>
<td>.00</td>
<td>2.98 to 10.13</td>
</tr>
<tr>
<td>Cared for someone in pain before</td>
<td>5.80</td>
<td>2.24</td>
<td>0.13</td>
<td>2.59</td>
<td>.01</td>
<td>1.39 to 10.22</td>
</tr>
<tr>
<td>Adequacy change</td>
<td>0.683</td>
<td>0.413</td>
<td>0.09</td>
<td>1.66</td>
<td>.10</td>
<td>-0.13 to 1.50</td>
</tr>
</tbody>
</table>

R
R² = 0.18
Sum of Squares = 4444.58
Mean Square = 1111.14
F = 16.58
Sig = .001

*English or non-English

a: Variable(s) removed: Nursing Program, Education in Healthcare, Age and Education in Pain Management
## Appendix J

### Question Chart

<table>
<thead>
<tr>
<th>Question</th>
<th># Answered</th>
<th># Missing</th>
<th># Correct</th>
<th>Valid % Correct</th>
<th>Imputed missing as wrong - % correct</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vital signs are always reliable indicators of the intensity of a patient’s pain</td>
<td>336</td>
<td>0</td>
<td>299</td>
<td>89.0</td>
<td>89.0</td>
</tr>
<tr>
<td>Because their nervous system is underdeveloped, children under two years of age have decreased pain sensitivity and limited memory of painful experiences</td>
<td>335</td>
<td>1</td>
<td>282</td>
<td>84.2</td>
<td>83.9</td>
</tr>
<tr>
<td>Patients who can be distracted from pain usually do not have severe pain</td>
<td>336</td>
<td>0</td>
<td>299</td>
<td>89.0</td>
<td>89.0</td>
</tr>
<tr>
<td>Patients may sleep in spite of severe pain</td>
<td>335</td>
<td>1</td>
<td>284</td>
<td>84.8</td>
<td>84.5</td>
</tr>
<tr>
<td>Aspirin and other non-steroidal anti-inflammatory agents are NOT effective analgesics for painful bone metastases</td>
<td>334</td>
<td>2</td>
<td>136</td>
<td>40.7</td>
<td>40.5</td>
</tr>
<tr>
<td>Respiratory depression rarely occurs in patients who have been receiving stable doses of opioids over a period of months</td>
<td>335</td>
<td>1</td>
<td>123</td>
<td>36.7</td>
<td>36.6</td>
</tr>
<tr>
<td>Combining analgesics that work by different mechanisms (e.g., combining an NSAID with an opioid) may result in better pain control with fewer side effects than using a single analgesic agent</td>
<td>335</td>
<td>1</td>
<td>296</td>
<td>88.4</td>
<td>88.1</td>
</tr>
<tr>
<td>The usual duration of analgesia of 1-2 mg morphine IV is 4-5 hours</td>
<td>331</td>
<td>1</td>
<td>90</td>
<td>27.2</td>
<td>26.8</td>
</tr>
<tr>
<td>Opioids should not be used in patients with a history of substance abuse</td>
<td>335</td>
<td>1</td>
<td>271</td>
<td>80.9</td>
<td>80.7</td>
</tr>
<tr>
<td>Morphine has a dose ceiling (i.e. a dose above which no greater pain relief can be obtained)</td>
<td>333</td>
<td>3</td>
<td>133</td>
<td>39.9</td>
<td>39.6</td>
</tr>
<tr>
<td>Elderly patients cannot tolerate opioids for pain relief</td>
<td>334</td>
<td>2</td>
<td>326</td>
<td>97.6</td>
<td>97.0</td>
</tr>
<tr>
<td>Patients should be encouraged to endure as much pain as possible before using an opioid</td>
<td>336</td>
<td>0</td>
<td>327</td>
<td>97.3</td>
<td>97.3</td>
</tr>
<tr>
<td>Children less than 11 years old cannot reliably report pain so clinicians should rely solely on the parent’s assessment of the child’s pain intensity</td>
<td>336</td>
<td>0</td>
<td>330</td>
<td>98.2</td>
<td>98.2</td>
</tr>
<tr>
<td>Patients’ spiritual beliefs may lead them to think pain and suffering are necessary</td>
<td>333</td>
<td>3</td>
<td>322</td>
<td>96.7</td>
<td>95.8</td>
</tr>
</tbody>
</table>
After an initial dose of opioid analgesic is given, subsequent doses should be adjusted in accordance with the individual patient’s response.

<table>
<thead>
<tr>
<th>Action</th>
<th>Patients</th>
<th>Placebo</th>
<th>Pain</th>
<th>Placebo</th>
</tr>
</thead>
<tbody>
<tr>
<td>Giving patients sterile water by injection (placebo) is a useful test to determine if the pain is real.</td>
<td>334</td>
<td>2</td>
<td>283</td>
<td>84.7</td>
</tr>
<tr>
<td>If the source of the patient’s pain is unknown, opioids should not be used during the pain evaluation period, as this could mask the ability to correctly diagnose the cause of pain.</td>
<td>330</td>
<td>6</td>
<td>159</td>
<td>48.2</td>
</tr>
<tr>
<td>Anticonvulsant drugs such as gabapentin (Neurontin) produce optimal pain relief after a single dose</td>
<td>331</td>
<td>5</td>
<td>274</td>
<td>82.8</td>
</tr>
<tr>
<td>Benzodiazepines are not effective pain relievers unless the pain is due to muscle spasm</td>
<td>333</td>
<td>3</td>
<td>130</td>
<td>39</td>
</tr>
<tr>
<td>Narcotic/opioid addiction is defined as a chronic neurobiologic disease, characterized by behaviors that include one or more of the following: impaired control over drug use, compulsive use, continued use despite harm, and craving</td>
<td>336</td>
<td>0</td>
<td>327</td>
<td>97.3</td>
</tr>
<tr>
<td>The recommended route of administration of opioid analgesics for patients with persistent cancer-related pain is:</td>
<td>334</td>
<td>2</td>
<td>53</td>
<td>15.9</td>
</tr>
<tr>
<td>a. intravenous</td>
<td>337</td>
<td>3</td>
<td>130</td>
<td>39</td>
</tr>
<tr>
<td>b. intramuscular</td>
<td>338</td>
<td>4</td>
<td>187</td>
<td>55.7</td>
</tr>
<tr>
<td>c. subcutaneous</td>
<td>339</td>
<td>5</td>
<td>247</td>
<td>74.6</td>
</tr>
<tr>
<td>d. oral</td>
<td>340</td>
<td>6</td>
<td>159</td>
<td>48.2</td>
</tr>
<tr>
<td>e. rectal</td>
<td>341</td>
<td>7</td>
<td>283</td>
<td>84.7</td>
</tr>
<tr>
<td>The recommended route administration of opioid analgesics for patients with brief, severe pain of sudden onset such as trauma or postoperative pain is:</td>
<td>336</td>
<td>0</td>
<td>187</td>
<td>55.7</td>
</tr>
<tr>
<td>a. intravenous</td>
<td>337</td>
<td>3</td>
<td>130</td>
<td>39</td>
</tr>
<tr>
<td>b. intramuscular</td>
<td>338</td>
<td>4</td>
<td>187</td>
<td>55.7</td>
</tr>
<tr>
<td>c. subcutaneous</td>
<td>339</td>
<td>5</td>
<td>247</td>
<td>74.6</td>
</tr>
<tr>
<td>d. oral</td>
<td>340</td>
<td>6</td>
<td>159</td>
<td>48.2</td>
</tr>
<tr>
<td>e. rectal</td>
<td>341</td>
<td>7</td>
<td>283</td>
<td>84.7</td>
</tr>
<tr>
<td>Which of the following analgesic medications is considered the drug of choice for the treatment of prolonged moderate to severe pain for cancer patients?</td>
<td>331</td>
<td>5</td>
<td>247</td>
<td>74.6</td>
</tr>
<tr>
<td>a. codeine</td>
<td>332</td>
<td>6</td>
<td>159</td>
<td>48.2</td>
</tr>
<tr>
<td>b. morphine</td>
<td>333</td>
<td>7</td>
<td>283</td>
<td>84.7</td>
</tr>
<tr>
<td>c. meperidine</td>
<td>334</td>
<td>8</td>
<td>187</td>
<td>55.7</td>
</tr>
<tr>
<td>d. tramadol</td>
<td>335</td>
<td>9</td>
<td>247</td>
<td>74.6</td>
</tr>
</tbody>
</table>

121
Which of the following IV doses of morphine administered over a 4-hour period would be equivalent to 30 mg of oral morphine given q 4 hours?

<p>| | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>a. Morphine 5 mg IV</td>
<td>b. Morphine 10 mg IV</td>
<td>c. Morphine 30 mg IV</td>
<td>d. Morphine 60 mg IV</td>
<td></td>
</tr>
<tr>
<td>327</td>
<td>19</td>
<td>107</td>
<td>32.7</td>
<td>31.8</td>
<td></td>
</tr>
</tbody>
</table>

Analgesics for post-operative pain should initially be given:

<p>| | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>a. around the clock on a fixed schedule</td>
<td>b. only when the patient asks for the medication</td>
<td>c. only when the nurse determines that the patient has moderate or greater discomfort</td>
<td></td>
<td></td>
</tr>
<tr>
<td>336</td>
<td>1</td>
<td>275</td>
<td>81.8</td>
<td>81.8</td>
<td></td>
</tr>
</tbody>
</table>

A patient with persistent cancer pain has been receiving daily opioid analgesics for 2 months. Yesterday the patient was receiving morphine 200 mg/hour intravenously. Today he has been receiving 250 mg/hour intravenously. The likelihood of the patient developing clinically significant respiratory depression in the absence of new comorbidity is:

<p>| | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>a. less than 1%</td>
<td>b. 1-10%</td>
<td>c. 11-20%</td>
<td>d. 21-40%</td>
<td>e. &gt; 41%</td>
</tr>
<tr>
<td>329</td>
<td>7</td>
<td>32</td>
<td>9.7</td>
<td>9.5</td>
<td></td>
</tr>
</tbody>
</table>

The most likely reason a patient with pain would request increased doses of pain medication is:

<p>| | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>a. The patient is experiencing increased pain.</td>
<td>b. The patient is experiencing increased anxiety or depression.</td>
<td>c. The patient is requesting more staff attention.</td>
<td>d. The patient’s requests are related to addiction.</td>
<td></td>
</tr>
<tr>
<td>336</td>
<td>0</td>
<td>324</td>
<td>96.4</td>
<td>96.4</td>
<td></td>
</tr>
</tbody>
</table>

Which of the following is useful for treatment of cancer pain?

<p>| | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>a. Ibuprofen (Motrin)</td>
<td>b. Hydromorphone (Dilaudid)</td>
<td>c. Gabapentin (Neurontin)</td>
<td>d. All of the above</td>
<td></td>
</tr>
<tr>
<td>335</td>
<td>1</td>
<td>245</td>
<td>73.1</td>
<td>72.9</td>
<td></td>
</tr>
</tbody>
</table>

The most accurate judge of the intensity of the patient’s pain is:

<p>| | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>a. the treating physician</td>
<td>b. the patient’s primary nurse</td>
<td>c. the patient</td>
<td>d. the pharmacist</td>
<td></td>
</tr>
<tr>
<td>336</td>
<td>0</td>
<td>331</td>
<td>98.5</td>
<td>98.5</td>
<td></td>
</tr>
</tbody>
</table>
Which of the following describes the best approach for cultural considerations in caring for patients in pain:

<table>
<thead>
<tr>
<th></th>
<th>334</th>
<th>2</th>
<th>309</th>
<th>92.5</th>
<th>92</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. There are no longer cultural influences in Canada due to the diversity of the population.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. Cultural influences can be determined by an individual’s ethnicity (e.g., Asians are stoic, Italians are expressive, etc).</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. Patients should be individually assessed to determine cultural influences.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d. Cultural influences can be determined by an individual’s socioeconomic status (e.g., blue collar workers report more pain than white collar workers)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

How likely is it that patients who develop pain already have an alcohol and/or drug abuse problem?

<table>
<thead>
<tr>
<th></th>
<th>323</th>
<th>13</th>
<th>116</th>
<th>35.9</th>
<th>34.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 1%</td>
<td>5 - 15%</td>
<td>25 - 50%</td>
<td>75 - 100%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The time to peak effect for morphine given IV is:

<table>
<thead>
<tr>
<th></th>
<th>334</th>
<th>2</th>
<th>259</th>
<th>77.5</th>
<th>77.1</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. 15 min.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. 45 min.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. 1 hour</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d. 2 hours</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The time to peak effect for morphine given orally is:

<table>
<thead>
<tr>
<th></th>
<th>334</th>
<th>2</th>
<th>144</th>
<th>43.1</th>
<th>42.9</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. 5 min.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. 30 min.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. 1 – 2 hours</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d. 3 hours</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Following abrupt discontinuation of an opioid, physical dependence is manifested by the following:

<table>
<thead>
<tr>
<th></th>
<th>333</th>
<th>3</th>
<th>96</th>
<th>28.8</th>
<th>28.6</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. sweating, yawning, diarrhea and agitation with patients when the opioid is abruptly discontinued</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. Impaired control over drug use, compulsive use, and craving</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. The need for higher doses to achieve the same effect.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d. a and b</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Patient A**

Andrew is 25 years old and this is his first day following abdominal surgery. As you enter his room, he smiles at you and continues talking and joking with his visitor. Your assessment
reveals the following information: BP = 120/80; HR = 80; R = 18; on a scale of 0 to 10 (0 = no pain/discomfort, 10 = worst pain/discomfort) he rates his pain as 8.

On the patient’s record you must mark his pain on the scale below. Circle the number that represents your assessment of Andrew’s pain:

<table>
<thead>
<tr>
<th>0-10 Likert Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>333</td>
</tr>
</tbody>
</table>

Your assessment, above, is made two hours after he received morphine 2 mg IV. Half hourly pain ratings following the injection ranged from 6 to 8 and he had no clinically significant respiratory depression, sedation, or other untoward side effects. He has identified 2/10 as an acceptable level of pain relief. His physician’s order for analgesia is “morphine IV 1-3 mg q1h PRN pain relief.” Check the action you will take at this time:

a. Administer no morphine at this time.
b. Administer morphine 1 mg IV now.
c. Administer morphine 2 mg IV now.
d. Administer morphine 3 mg IV now.

Patient B

Robert is 25 years old and this is his first day following abdominal surgery. As you enter his room, he is lying quietly in bed and grimaces as he turns in bed. Your assessment reveals the following information: BP = 120/80; HR = 80; R = 18; on a scale of 0 to 10 (0 = no pain/discomfort, 10 = worst pain/discomfort) he rates his pain as 8.

On the patient’s record you must mark his pain on the scale below. Circle the number that represents your assessment of Robert’s pain:

<table>
<thead>
<tr>
<th>0-10 Likert Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>332</td>
</tr>
</tbody>
</table>

Your assessment, above, is made two hours after he received morphine 2 mg IV. Half hourly pain ratings following the injection ranged from 6 to 8 and he had no clinically significant respiratory depression, sedation, or other untoward side effects. He has identified 2/10 as an acceptable level of pain relief. His physician’s order for analgesia is “morphine IV 1-3 mg q1h PRN pain relief.” Check the action you will take at this time:

a. Administer no morphine at this time.
b. Administer morphine 1 mg IV now.
<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>c.</strong> Administer morphine 2 mg IV now.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>d.</strong> Administer morphine 3 mg IV</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Appendix K

Residual Plot

Scatterplot

Dependent Variable: KASRP Score