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NON-RADIOLOGY NURSES' EXPERIENCE WITH INTERVENTIONAL RADIOLOGY

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Approval of Thesis

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"Enjoy the journey as much as the destination" ~ Marshall Sylver

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Abstract

Interventional Radiology (IR) is an innovative subspecialty of radiology where minimally invasive procedures are performed by a dedicated team of interventional specialists including registered nurses for therapeutic and diagnostic purposes. Nursing care for IR patients also occurs in areas of the hospital by nurses who do not have specialized IR training. Few educational opportunities exist for non-radiology nurses to develop needed IR knowledge and related skills. This thesis was designed to understand the experiences non-radiology nurses have caring for IR patients. Transcribed semi-structured interviews with ten non-radiology nurses caring for patients in a Canadian hospital provided rich data for analysis. The themes nursing curriculum; acquired knowledge; IR procedures; building trusting therapeutic relationships; continuity of care; and non-radiology nurses' overall experiences contributed to the conceptualization of how non-radiology nurses provide care and what their IR learning needs are. Enhancing IR training and support programs and promoting interdepartmental collaboration are key recommendations.

Keywords: IR nursing, interventional radiology education, non-radiology nurse

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Chapter 1. Introduction

> "The magic of Interventional Radiology – a compelling and spirit-lifting reaffirmation of the beautiful timeless and truth that less is more" (Dake, 2012, p. 1335).

A visit to the radiology department for the purposes of either confirming or ruling out a diagnosis is likely to occur at some point during a patient's hospital admission. Interventional radiology (IR) is the subspecialty area within radiology, that differs from diagnostic radiology, in that minimally invasive procedures are performed for diagnostic, therapeutic, curative and palliative purposes using the imaging guidance of ultrasound, fluoroscopy, and computed tomography (CT) (Canadian Association of Interventional Radiology, 2018). Over the past few decades, IR has become an increasingly important speciality in the health professions. This innovative practice using local and conscious sedation in IR facilities has become a viable option to traditional surgery with general anesthesia in operating rooms. The multipurpose nature of these procedures combined with the benefits of shorter hospital stays, improved patient outcomes and hospital cost savings has resulted in an increased demand for IR services (Zeidenberg, 2007). These procedures are performed in IR suites within acute care facilities with a dedicated team of interventional radiologists, medical radiation technologists (MRT) and registered nurses (RNs).

Nursing in IR is diverse and multifaceted, where caring is provided to both in-patients, and out-patients of all ages. These patients are pre-scheduled for an elective procedure or have an emergent procedure because they are at high risk of mortality or morbidity. Many nursing skills from different nursing specialities are required to ensure the patients are cared for safely with optimal outcomes. A variety of nursing skills contributes to the diversity, for example, critical care skills are needed to monitor patients intra-procedurally; ambulatory nursing skills are needed to assist with the flow and efficiency of the day; operating room skills to scrub and

circulate are used during the procedure; post anesthetic care unit (PACU) or recovery room skills are utilized to monitor the patients who have had conscious sedation after the procedure; and medical, surgical and palliative nursing skills are necessary to manage the co-morbidities that often exist with IR patients. IR nurses also provide patient education and discharge teaching to ensure success at home for the patients who are discharged. Interprofessional and interdepartmental collaboration occur daily to facilitate IR procedures.

The future of IR continues to progress with a focus on clinical vision, patient interactions and "the new applications of existing techniques, particularly embolotherapy and interventional oncology; the cutting-edge devices; the imaging technologies at the forefront of the image-guidance" (Midulla et al., 2019, p. 1.). In Canada, IR was officially recognized as a subspecialty of radiology in 2012, much later than was acknowledged in other countries. Within the Registered Practical Nurse (RPN)/Licensed Practical Nurse (LPN) programs and the Registered Nurse (RN) programs in Canada there may be limited, if any, formal pre-service education specific to IR. Nursing knowledge specific to IR is typically acquired from experience, attending conferences and affiliation with various associations.

The Canadian Association of Interventional Radiology (CAIR) is a multidisciplinary group geared to interventional radiologists, registered nurses and medical radiation technologists (MRTs). Their mission is to help Canadians achieve optimal health and quality of life using IR procedures (CAIR, 2018). They offer a website with links to various resources and publications as well as an annual meeting. The role of the IR nurse is described on the website with a link to the Association for Radiologic and Imaging Nursing (ARIN). This association is in the United States (US) and actively promotes the profession of nursing in IR through interprofessional awareness, educational resources and certification in radiology nursing through the Radiologic

Nursing Certification Board (RNCB) (ARIN, 2020). However, it is important to emphasize in Canada, there are no provincial or national nursing organizations that exist to lead, educate, promote or advance awareness and knowledge of IR nursing.

Internationally, the US based Society of Interventional Radiology (SIR), like CAIR, is predominantly geared toward medical professionals. Access to various resources, publications and annual meetings can be found on their website (SIR, n.d.). Sweden was the only country found to offer a Bachelor of Science in Diagnostic Radiology Nursing program (Lundgren & Furaker, 2014). Graduates from this program are registered nurses with a bachelor's degree who only provide patient care within IR facilities (Lunden, Lundgren & Lepp, 2012).

Nursing care for IR patients extends beyond the IR department into other nursing wards in the hospital and is provided by nurses who do not share the same familiarity with the subspecialty of IR. What effect this lack of IR education and support in Canada has on these non-radiology nurses working in other areas of the hospital and caring for the rising number of IR patients is unknown.

Significance of the Research

An exploration of non-radiology, hospital nurses' experiences with IR will inform and benefit educators and practitioners in both pre-service and in-service programs. The topic is highly underrepresented in the literature and what little is known suggests that these nurses are unaware of the specialty of IR and feel unprepared to provide care for IR patients. With this inquiry I aimed to bridge this knowledge gap by developing an understanding of (a) what nurses already know and how they learned that information, (b) what their perceptions are about what

they still need to know to provide safe care to IR patients in hospitals, and (c) what their experiences are when providing IR patient care.

The results of this study will provide information for local pre-service and in-service educators to develop orientation programs, educational activities and build interdepartmental collaboration efforts. Dissemination of the findings will contribute to increased awareness and the transfer of knowledge about the specialty of IR nursing. This information will be used to develop academic nursing curriculum units, community, and primary care programs, and inform professional associations about this specialty practice. The potential to optimize patient outcomes increases when all nurses share a familiarity with the speciality of IR.

Purpose of the Research

The purpose of this research project was to explore non-radiology nurses' experience caring for IR patients, specifically:

- What do non-radiology nurses' in hospitals learn about caring for IR patients' in pre-service and in-service programs?
- What are non-radiology nurses' perceptions of what they need to know to provide safe care to IR patients in hospitals; and
- What are their experiences when providing IR patient care in hospitals?

The findings from this inquiry have implications for clinical nursing, nursing education, and research.

Personal Biases to the Research

I am deeply devoted to the specialty of nursing in IR. My past work experiences include leadership and clinical nurse specialist roles in academic IR centres within Canada and the US. I currently work as an IR staff nurse in a local community hospital. I am one of only four Canadian RNs who hold a certified radiology nurse (CRN®) designation and am keen to increase awareness and advance IR nursing in Canada. The interprofessional relations that I experience on a regular basis with interdepartmental non-radiology nurses working in the hospital led me to this inquiry that explored non-radiology nurses' experience(s) caring for IR patients.

My personal experiences working in IR led me to this investigation. It was therefore imperative that during this study I identified and set my experiences, feelings, and understandings apart from the participants. As a qualitative researcher, I am intricately linked to each phase of the research process and due to the subjective nature of qualitative description my biases and assumptions were never completely out of the study. As Glesne (2016) states "a focus on subjectivity stimulates an examination of values, beliefs, and autobiographical experiences engaged by the research" (p. 146). Setting aside my experiences helped me to focus on the experiences of the non-radiology nurses and to view their experiences with a fresh perspective (Creswell & Poth, 2018). This occurred through the processes of bracketing and reflexivity.

Bracketing is the process by which I openly acknowledged my feelings and experiences with non-radiology nurses and IR. I was cognizant of how they could affect the research process. It involves suspending our understandings through reflection to nurture curiosity (Creswell & Poth, 2018). I engaged in reflexivity throughout this inquiry by being acutely aware of my assumptions, position, and motives to ensure the participants were not influenced by these during

this research process. "Reflexivity thus is often understood as involving an ongoing self-awareness during the research process which aids in making visible the practice and construction of knowledge within research in order to produce more accurate analyses of our research" (Pillow, 2003, p. 178). To be reflexive one must think deeply and ask questions from the inception of a research inquiry through the dissemination of findings (Glesne, 2016). I documented the thoughts that influenced my decisions throughout this entire project in a reflexive journal and discussed research interactions with my supervisor.

I considered how my role as an IR nurse working in the same hospital might influence my sample population. My relationship with the non-radiology nurses in the hospital is professional and equal. I was not in a position of power and did not work directly with any of the participants. Prior to this study, our interactions had occurred in the context of the transfer of accountability with patients coming and going for procedures within IR. My assumptions, as a result of the encounters I had with non-radiology nurses in the hospital and the inpatients they cared for, was that they lacked general awareness and knowledge about the specialty of IR and the procedures performed within. This was evidenced by communications with non-radiology nurses; from assessments of the inpatients that came through the IR department; and from feedback from other IR personnel.

I have developed a new appreciation and understanding of the experiences non-radiology nurses have when caring for IR patients as a result of this study. Having this new perspective helps me to know how to engage these nurses in the specialty of IR.

Summary

This inquiry began with my curiosity about the experiences nurses have when caring for

IR patients, specifically nurses who do not work in radiology. Non-radiology nurses' exposure to IR within the PRHC is limited despite many inpatients requiring the services of IR. As a nurse who specializes in IR, I wanted to explore their experiences and gain an understanding of what it is like for them to care for IR patients.

Chapter 2. Review of the Literature

Search Methods

A search of the literature was done through Google Scholar and the Athabasca University journal database using EBSCO host. Boolean searching was done to combine the concepts: "nurse* experience", "Interventional Radiology" and radiology (Athabasca University, 2017). There were no dates placed to limit the search results. Google scholar rendered 61 results. None of these results were specific to interventional radiology. They related to nurses' experiences with workplace stress, professional identity, incivility and transitioning to workplaces.

Another search using CINAHL® matched 596 articles. Upon review, a large majority of these related to oncology, therefore the search was repeated using the Boolean, NOT oncology, and this revealed 51 matches. Only one article was specific to nurses' experience with patients who had undergone a specific interventional radiology procedure. A final search using MEDLINE/PubMed® resulted in zero title matches. A detailed review of the 51 articles was done to determine that 36 were pertinent for inclusion as corroboration to non-radiology nurses' experiences with interventional radiology.

After I conducted, transcribed, and reviewed the interviews, I evaluated peer-reviewed articles published in the *Journal of Radiology Nursing* from 2014 to present. Each article was examined for inclusion based on preliminary review of the study data. An additional 37 articles were deemed relevant for this study, for a total of 73 articles.

The literature encompasses a broad geographic reach with studies conducted in Canada, United States, Ireland, Saudi Arabia, South Africa, Brazil, Japan, China, Sweden, India and Pakistan. I identified the following themes from the literature; experiences; IR lack of awareness; IR nursing knowledge and education; IR procedural knowledge; clinical care; clinical support; transition of care; and handing off.

Experiences

The experiences derived from the literature about radiology and IR encompassed various perspectives. These have been identified in reports from nurses, patients, specific procedures, and clinical standpoints. These are as follows:

Nurses' experiences. Research relating to nurses' experiences specific to IR is lacking in the literature. I found only two studies that reported explicitly about nurses' experiences caring for IR patients. The first study by Lunden, Lundgren and Lepp (2012) described the experiences of Swedish nurse radiographers (which translated means "radiology nurse") who work in the specialty of IR and care for patients during their IR procedures. The findings demonstrated the complexity of caring for this patient population and described the meanings that contributed to the overall finding "expressed by the participants as sensing and responding to the patients" (p. 55). The importance of developing trust; having sufficient time to get to know their patients and obtain adequate information prior to the procedure; "dealing with unpredictable outcomes; and dealing with pain and agony" were the four main themes (p. 57).

The second study by Farrell and Halligan (2017) explored the experiences of community nurses in Ireland caring for patients who had been discharged home from the hospital after having a percutaneous drain placed in IR. Farrell and Halligan found community nurses experienced gaps in knowledge with participants reporting the knowledge deficit they had "in the area of IR and in particular, caring for patients with IR drains"(p. 229). In their study all the participants described the novelty of "caring for patients with IR drains" and words such as "daunting" were used to express this (p. 230). Farrell and Halligan noted

> there was an overwhelming consensus that more education and training for nurses in the community was necessary in IR and IR drain care as the lack of education and training

> impacted the participants' experiences of caring immensely. All participants described having neither any training in how to care for patients with IR drains nor any basic education in IR and the procedures carried out. (p. 234)

The gaps in knowledge, education and information that Farrell and Halligan's study revealed show that these community nurses in Ireland did not feel well prepared to care for this patient population (2017). The results of this study have brought forth the need for education and training about the specialty of IR, particularly, percutaneous drain care. My study differs from both these with a focus on the experience of non-radiology nurses working with hospitalized patients in Canada.

In another study, Makanjee, Bergh and Hoffmann (2014) explored nurses' experiences in terms of their roles with patient care and the interprofessional relations with the diagnostic imaging departments of two hospitals in South Africa. Four focus groups were held. Three of the four focus groups were nurses who worked on the hospital wards and one of the four focus groups was with nurses who worked only in the diagnostic radiology department. One of the findings revealed "their professional role to be particularly evident in the care of and communication with patients" (Makanjee, Bergh & Hoffman, 2014, p. 113). An essential role of the ward nurses was to explain, interpret and communicate information about the referral, the investigation and post investigation. They also held the responsibility of clarifying the medical language used by health professionals to avoid patient confusion and mistrust (Makanjee, Bergh & Hoffmann, 2014). Another finding from this study revealed that the role of ward nurses going to the radiology department was limited to bringing the patients referral forms and waiting outside the imaging area for the patients test to be completed. Lack of collaboration between nurses and radiologists led them to feeling their roles were perceived as being insignificant due

to a lack of understanding and appreciation of each other's tasks (Makanjee, Bergh & Hoffman, 2014).

Not unlike the gaps in knowledge that Farrell and Halligan identified specific to IR, Makanjee, Bergh and Hoffman (2014) stated

> In this study, nurses identified gaps in their knowledge at various levels of the tasks they were required to perform and the activities they were involved with. The three main needs expressed were the following: patient preparation, interpretation skills, and radiation risks and safety. The adequate preparation of patients in terms of what to expect from and during specific types of imaging investigations requires knowledge of the different investigation types and processes involved. It also involves the skills required for making efficient judgement calls. (p. 111)

Further to this study, an opportunity exists to explore the experiences non-radiology nurses have working on the wards of a Canadian hospital caring for patients coming through the diagnostic imaging specialty of IR.

Prevalent in the literature were general studies that were not specific to radiology or IR that addressed nurses' experiences with workplace stress and burnout, (Olofsson, Bengtsson & Brink, 2003; Billeter-Koponen & Freden, 2005) as well as nurses' experiences relating to their daily work (Hallin & Danielson, 2007) and professional identity (Fagerberg, 2004).

Patients' experiences. The experiences of patients undergoing specific IR procedures is well described in the literature. Chemotherapy patients having a peripherally inserted central catheter (PICC) were found: to experience anxiety about not knowing what to expect; to use various coping strategies to deal with the procedure; and were unable to separate the PICC experience from their cancer diagnosis (Nicholson & Davies, 2013). Patients' feelings of calm

and anxiety were explored when having an IR peripheral percutaneous transluminal angioplasty procedure (Lunden, Lundgren, Persson & Lepp, 2013). Degrees of calmness and anxiety were dependent on trust in their caregiver and the amount of knowledge they had about their disease and options for treatment (Lunden et al., 2013). Patients' understanding and overall satisfaction about their IR gastrointestinal procedures was significantly improved when specialist nurses provided patient education (Davies et al, 2004).

In-patients experience feelings of anxiety prior to their IR procedures. Caring for the psychological and emotional needs of patients is what patients perceived to be missing on the hospital medical and surgical inpatient wards (Bagnasco et al., 2019). Knowledge deficits about IR procedures inhibits the ability of ward nurses to support patients' psychological and emotional needs inhibiting their ability to provide holistic nursing care.

A study of patients' perceptions of quality of care in a radiology department revealed that the following factors and demographics contributed significantly to a lower perceived quality of care: long wait times; untimely telephone contact and appointments; being a woman; having less education than other patients, and being aged 56-75 years (Blomberg, Brutin, Andertun & Rydh, 2010). The authors speculated that increasing interaction and giving people more information may increase the perceived quality of care within the radiology department.

Procedural and clinical experiences. Multiple studies have been published that describe IR procedures and the clinical conditions for which they are performed. These studies include comprehensive descriptions of arterial embolization to treat post-partum hemorrhage, uterine fibroids, enlarged prostates and gastrointestinal bleeding, as well as, nursing care that is expected before, during and after these procedures (Mahankali, 2017; Binkurian, Linnane & Browne, 2015; DeJesus, Echenique & Absich, 2016; Lehman, Rosenberg, Shrestha, Golzarian &

Schooley, 2015; Azeze, Rahim, Sands, Shrewsbury & Tavri, 2018). A retrospective review was done to evaluate the IR treatment of deep pelvic abscesses with the insertion of a percutaneous abscess drain using a trans gluteal CT-guided approach (Robert et al., 2016). Their review demonstrated that diligent post-procedure daily catheter care prevented complications and contributed to an excellent patient experience. As a result this procedure was safe, well-tolerated and should be the primary alternative to a surgical intervention.

Port implantable venous access devices are placed percutaneously in IR. These devices are used regularly and routinely to infuse medications, blood products and for blood sampling. A study evaluating 40 ports and 40 patients found these devices had less risk of complication, less cost and were deemed an excellent alternative to surgically placed ports according to both patients and nurses (Kahn, Barboza, Kling & Heisel, 1992). Despite evidence in the literature that recognizes IR to be an excellent alternative to some surgeries it remains quite an unknown specialty area amongst various health care professionals.

IR Lack of Awareness

Farrell and Halligan (2017) reported in their study that nurse participants consistently reported that the specialty of IR was a "completely unknown entity" to them and to other health care professionals (p. 232). Radiology departments and IR suites are typically located off the beaten path within a hospital and have restricted access because of the use of ionizing radiation. Potter acknowledged that radiology nurses typically work in isolation from larger groups of staff nurses (2015).

In 2005, Goodhart and Page provided a brief history of radiology nursing and described the nursing role within the multiple modalities of radiology including IR. A descriptive overview of the specialty of IR was recently published to acquaint legal nurse consultants with the

complexities associated with the minimally invasive procedures performed within this leading-edge realm of health care (Lockeretz, 2017). Clinical nurse specialists (CNSs) working in IR in the US were described as being responsible for informing all clinicians and non-clinical personnel about the medical, scientific and technological requirements, benefits, risks and alternatives to IR (Muehlbauer, 2011). A Canadian nurse who works in the IR department reported that people are generally not aware of radiology nursing including colleagues who work in the same hospital and a category for radiology nursing does not exist on the provincial registered nurse (RN) license form (Kelly, 2013).

Research in the area of direct radiology nursing care is scant. Werthman conducted two US studies to review existing literature that focused on: patient satisfaction in radiology; and the effect of radiology nurses and patient outcomes (Werthman, 2019; Werthman, 2018). Both resulted in a substantial lack of evidence with considerable opportunities for future studies in this field (Werthman, 2019; Werthman, 2018). There is little known about IR and a general lack of awareness about the role nurses have within this specialty because it is not a focus of nursing curricula and the opportunities for clinical rotations are extremely rare (Moyo, 2019; Vlach, 2018). This lack of awareness lends itself to gaps in IR nursing knowledge and educational opportunities.

IR Nursing Knowledge and Education

A significant finding from a study by Clark and McClain "revealed a perceived lack of knowledge about IR nursing on the part of those in allied nursing specialties and a general lack of acknowledgement and support from nursing administration" (2004, p. 8). They reported inconsistent management of IR nurses; IR having typically fewer nurses compared with emergency and critical care areas; the newness of the specialty of IR nursing; the recruitment of

nurses with the necessary high level of nursing proficiency to other critical areas; and IR nursing positions may be considered lower priority when competing with areas that have higher turnover rates (Clark & McClain, 2004). Sousa (2011) also reported a void in knowledge specific to the specialty of radiology noting hospital educators frequently lack this experience and called for "the creation of programs that provide specific training and education to bridge this gap" (p.136).

It was difficult to find information in the literature about formal nursing education specific to the specialty of IR. Post graduate programs specific to nursing and radiology do exist in other countries such as Sweden and Japan (Lundgren & Furaker, 2014; Shimizu, Lido & Nenoi, 2019). The University of Gothenburg in Sweden offers a unique Bachelor of Science in Radiology Nursing degree.

> Sweden has a special category of nurses, radiology nurses, who are a distinct professional group with a different educational basis from registered nurses and are not a further specialization based on previous education in general nursing, as is the case in some other countries. Completed education in radiology nursing does not allow for practice as a general registered nurse, nor can registered nurses practise radiology nursing. A three-year educational programme (180 ECTS credits) leads to licensure as a radiology nurse and a bachelor's degree in radiology nursing. (Alenius, Lindqvist & Tishelman, 2019, p. 162)

The National Institute of Radiological Sciences (NIRS) in Japan currently offers a five-day training course for nurses to learn "nursing related to radiologic medical care and radiation protection" (Shimizu, Lido & Nenoi, 2019). These authors reported that a new guideline in 2017 states

> basic knowledge on radiation, which has not been taught in nursing school, is supposed to be taught as an independent subject. More than 250 universities are providing nursing education in Japan. Therefore, the proportion of nurses with high knowledge of radiation basics is expected to rise…". (p. 36)

IR nursing in China is considered "an independent knowledge system and a new brand of nursing" (Xu, Wang & Cheng, 2019, p. 106). The hospitals there have dedicated wards for IR patients where only specialized intervention nurses and physicians care for them before and after their procedures. This is unique compared to other countries. China has embraced intervention nursing with a system that supports "nurses' active learning, continuous exploration and experience accumulation in clinical practice" (p. 107).

Powell (2007) developed and assessed a clinical practice experience in IR for third year undergraduate nursing students in Canada. He found "through this experience, the students became aware of the existence, scope of practice, and the role of the interventional radiology department in today's health care system" (p. 479). Eight years later, the benefits and processes involved with designing an IR clinical practicum for CNSs in the United States was discussed by Penzias, Cadman, Sullivan and McIntosh (2015).

Hospital education centers are common but education regarding IR nursing is rare. Nurses who work in the radiology department in an academic hospital in South Africa also received no formal training specific to radiology nursing (Makanjee, 2014). In contrast, a nursing education centre in Saudi Arabia that was lacking courses and formal training solely devoted to radiology, successfully collaborated with the Association for Radiologic and Imaging Nursing (ARIN) in the US to increase their knowledge with a course aimed exclusively for nurses (Mustonen, 2016).

Nurses working in IR or on the wards where portable bedside x-rays are done are at risk of exposure to the harmful effects of ionizing radiation. Studies have shown a positive relationship between education level and awareness of radiation safety (Thambura, Vinette & Klopper, 2019; Babaloui, Parwaie, Refahi, Abrazeh & Ardekani, 2018). The authors from both studies recommended that formal education about radiation principles and safety should be incorporated into nursing curriculum and hospital in-service training.

In the literature IR nursing education is broad and does not clearly describe any programs that deliver knowledge specific to the different procedures that are performed within this specialty. This knowledge gap was highlighted previously with the experiences cited in the studies about the community nurses' in Ireland and the ward nurses' in South Africa.

IR Procedural Knowledge

A number of studies speak to the knowledge needed to care for patients who have had an IR procedure. Case studies are presented in the literature to enhance learning. Warren, Somers, Chambers & Gardner (2019) present a case study about a rare complication that can occur after a percutaneous lung biopsy to increase awareness of current recommendations for how the patient should be positioned and supported should this occur. An in-depth case study about deep vein thrombosis and thrombolysis treatment presents the patient anatomy, procedure description and discussion, depiction of a structural outline of the process, as well as, the detailed nursing care required over the three days of intervention which highlights the need for patient assessment and monitoring, management of the catheter with medications and patient education (Desai, Dhurairaj, Glass, Donnelly & Sacks, 2019). IR works closely with nephrology with the daily insertion and management of vascular access devices for hemodialysis. The value of the working relationship between the services of IR and nephrology is emphasized with the presentation of a

case study highlighting the various IR procedures and knowledge needed to provide optimal patient care (O'Rear, Jacob, Parekunnel, Joby & Qian, 2018).

McClaran & Scarbrough, (2015) conducted a root cause analysis using a case study to determine what led to a patient unnecessarily losing a limb and suffering an untimely death after having an IR arteriogram procedure. They found the ward nurses who were responsible for the post procedural care of the patient did not perform an adequate basic assessment; failed to follow the physician orders to perform pulse checks; failed to communicate patient symptoms to the physician and; were lacking "exclusive education involving best practice of the post-arteriogram patient" (p. 41).

A primary role of the IR nurse is to administer conscious sedation during the procedure. Each nurse's experience with giving conscious sedation is unique, as is the response of each patient who is receiving it. At least one study evaluated nurses' 1) perceived importance, 2) competence, and 3) confidence and satisfaction with giving sedation before and after receiving formal theoretical and practical education (Tuck, Riley, Krenzischek & MacDonald, 2018). The significant findings indicated an increase in scores related to all three attributes after receiving the education (Tuck et. al, 2018).

Two articles offered continuing nursing education (CNE) contact hours. Shipley, Gallo and Fields (2016) conducted a pre and post educational intervention assessment to improve patient outcomes with gastrostomy and gastrojejunostomy feeding tubes in long-term care facilities which concluded with positive results. A quality improvement initiative to change practice around the standards of care and catheter selection for hemodialysis tunneled, cuffed catheters was also successful with time, education and staff involvement (Smith, 2010).

The need for central venous access devices (CVADs), such as PICCs, to facilitate treatment is becoming prevalent. The literature discusses the importance of nurses acquiring knowledge for the care, insertion, management, and dissemination of this information about CVADs (Askey & Clements, 2019; Purdon, 2009; Paolucci, Nutter & Albert, 2011). Percutaneous nephrostomy and biliary catheters are other procedures done in IR. Information detailing these procedures including pre, intra and post-procedural nursing care is available in the literature (Sharma, Frederic, Thuong & Grossman, 2016; Phillippe, Graham & Almeda, 2018).

Nursing knowledge of IR procedures is also crucial to providing discharge teaching for the successful management of patients at home and to facilitate discharge planning. Prior to discharge, oncology patients need to be fully educated from point of contact through post-procedure, including knowledge about complications and when to contact their healthcare provider (Graham & Almeda, 2018). Farrell and Hallighan (2017) found nurses who worked in the community and saw patients in their homes "felt they had no choice but to send patients back into the hospital when issues arose because they did not have the education or information to be able to cope" (p. 232). The ability of nurses to deliver quality clinical care pre and post discharge after an IR procedure is vital to preventing complications, achieving optimal patient outcomes, reducing lengths of hospital stays and reducing readmissions to hospital.

Clinical Care

Multiple articles found in the literature discuss various components of clinical care that affect IR patients. Pre-procedural assessments to determine if a patient can safely tolerate an IR procedure is important to reduce the risk of serious complications and promote the best outcomes for patients (Hromadik, 2019). The significance of post-procedure clinical assessments by both IR nurses and non-radiology nurses upon discharge to the floor are mentioned frequently.

McClaren and Scarbrough (2015) identified that the sub-standard nursing skills of non-radiology nurses' neurovascular and pain assessments after a patient's arteriogram directly contributed to the patient's untimely death. Another study defined and discussed the risk factors associated with a specific post vascular access complication called a pseudoaneurysm (PSA) (Majdalany, Kobeissi, Goodson & Khaja, 2018). These authors presented the clinical findings and diagnostic work-up for a PSA. They also noted that "postprocedural clinical evaluation of the access site is key to the early detection of a potential complication and to facilitate its prompt management" (Majdalany et al., 2018, p. 68).

There was a lack of information, evidence and guidance for nurses caring for patients having percutaneous nephrostomy tubes inserted in IR (Martin, 2019). Martin presented a clinical practice review that describes this process in detail recognizing that the "care and management of patients with a nephrostomy is a fundamental aspect of nursing" (2019, p. 40). Preventing complications is imperative when nurses are providing care to IR patients. Patients who have had a percutaneous nephrostomy tube inserted are at risk for developing multiple complications that often land them in the emergency department. Ritz, Speroni and Walbridge (2016) discussed a quality improvement initiative that included 24/7 access to IR staff resources, diligent patient and caregiver education pre-discharge from the hospital and strict follow-up for dressing changes and tube care. As a result of this initiative patient outcomes improved and hospital admission rates decreased (Ritz, Speroni & Walbridge, 2016).

The management of CVADs are the responsibility of both IR and non-radiology nurses. It is not an uncommon occurrence for these devices to malfunction and require the services of IR to restore function. Waagen and Bliss (2003) described the creation of assessment and algorithm protocols to assist nurses in determining the cause of the CVAD malfunction prior to

communicating with IR which in turn decreases treatment costs, avoids unnecessary trips for the patients off unit and prevents the disruption of the IR daily schedule.

Performing patient assessments and observing the clinical function of patient devices is imperative to supporting the clinical caring of patients. Evidenced-based hospital policy and procedure protocols combined with expert sharing of information between colleagues facilitates the clinical support necessary to uphold safe patient care.

Clinical Support

The importance of developing and using evidence-based policy and procedure protocols to uphold patient safety is especially crucial in a specialty area like radiology because there are multiple modalities, with a variety of procedures and limited knowledge of the patients prior to the procedure (Ott, 2016). Cipriano (2016) echoes these thoughts in her editorial when she noted that nurse expectations "include the responsibility to promote a culture of safety, which includes establishing and following policies that protect patients from harm" (p.1).

Non-radiology nurses who work with hospitalized hemodialysis patients were an integral part of a quality improvement activity that involved the creation of a risk factor reporting protocol for central line-associated bloodstream infections (CLABSI) (Conwell, Aniskiewicz, Ghidini & DeVaux, 2019). This improvement activity was found to decrease the 12% to 25% mortality rate that is associated with these infections (Conwell et al., 2019). Evidence-based guidelines also exist to reduce PICC complications, such as thrombosis and CLABSI, that result in "40% of adult inpatient PICCs being removed before completion of their intended therapy resulting in reinsertion" (McArthur, 2018, p. 34). McArthur discovered that multi-lumen PICCs are placed for convenience, despite the guideline stating single-lumen PICCs are preferred to reduce complications and noted that "hospitalists were unaware of the association between

device characteristics, such as number of lumens, gauge, and risk of complications" (2018, p. 35). She identified two strategies, a single lumen selection policy and electronic communication tool that are showing promise to reducing PICC complications (McArthur, 2018). Experiences with policy and procedures are not explicitly discussed in the literature in relation to non-radiology nurses working with IR patients in the hospital.

According to Logue et al. (2018), non-radiology nurses who work at the bedside are heavily involved with caring for patients after receiving revascularization for the treatment of an acute stroke. Forty percent of these patients have a minimum of one other IR procedure during their recovery, such as, placement of an inferior vena cava (IVC) filter, insertion of a PICC or percutaneous gastrostomy tube (Logue et al., 2018). An important role for radiology nurses is to support their clinical colleagues by sharing knowledge to ensure IR patients receive safe care with minimal complications (Logue et al., 2018). The clinical care of IR patients is multifaceted and does not occur in isolation from other professionals or specialty services.

Facets of Clinical Care

Interventional radiology is a referral-based service between a variety of clinical specialties, such as vascular medicine, nephrology, oncology, gastroenterology and general surgery. A Canadian national survey that was done in 2005 revealed that only 29% of interventional radiologists had admitting privileges and that this significantly inhibited their ability and desire to take full clinical ownership of their patients (Baerlocher, Asch, Haayeems & Collingwood, 2006). Reasons for this were cited as lack of hospital support, renumeration, time and limited numbers of interventional radiologists (Baerlocher et al., 2006). A more recent Canadian national study reported admitting privileges had increased from 29% to 46% citing similar reasons (Zener et al., 2018). As a result of interventional radiologists not having the

privileges to admit and follow-up with their own patients, collaboration, teamwork, exceptional communication skills, and consistent patient handoffs with non-radiology nurses are integral to the specialty of IR nursing practice. The safety of IR patients depends on it.

Advanced Practice Nursing Roles in IR. The increased emphasis on the clinical care of IR patients has brought forward the introduction of Advanced Practice Nurses (APNs) into IR departments. These advanced practice nursing positions have been reported in the literature as Nurse Practitioners (NPs), CNSs, APNs and Nurse Navigators (NNs) (Dryer, 2006; Lehmann, 2020; Wempe, 2015; Brown, 2012). The key responsibilities of each of these roles will vary depending on the needs of the individual IR department that employs them. Similar to the CNS role, they all serve to provide continuous improvement of patient outcomes and nursing care through leadership, collaboration, guidance, coaching, evidence-based-practice, ethical decision making and consultation (Lehmann, 2020).

Collaboration. Collaborative efforts occur between specialty services, in-hospital nursing wards and other professionals within the hospital. Two studies have been done specifically with radiology and nursing students to increase understanding of the contribution of both these professions as well as to implement standard communication processes to promote safe patient care (Karnish, Shustack, Brogan, Capitano & Cunfer, 2019; Mouser, Wallace, Whitmore & Sebatian, 2018). In Sweden, nurses and radiographers were taught collaboration using drama as the education forum. This study found using drama was a fun way to promote self-reflection, teamwork, bonding, awareness and empathy of the other professions (Lunden, Lundgren, Morrison-Helme & Lepp, 2017).

The significance of the collaboration and teamwork between the services of IR and nephrology are described by O'Rear, Jacob, Parekunnel, Joby and Qian (2018). The life of a

hemodialysis patient is dependent upon the optimal functioning of their venous access device which requires accurate assessments by non-radiology hemodialysis nurses at the bedside and timely reporting of the problem to the IR department (O'Rear et al., 2018).

Liaising. Harney, Hevener and Riveros (2018) used case studies to exemplify how the home care clinical liaison identified patients who required increased support, co-ordinated care between IR and mobilized homecare resources to increase patient success at home and decrease readmission rates. Case studies were used in another study to highlight functional and dysfunctional teamwork and communication along with a discussion about the barriers and strategies to improve and promote successful teamwork and communication amongst an IR team (Ramaswamy, Tiwari, Ramaswamy & Akinwande, 2017). The specialized radiology nurse is in a unique position to liaise with the emergency department to create a team approach in assessing and determining the radiological needs of a patient (Solheim, Storm & Whitney, 2018). The importance of establishing working relationships to function as a team is highlighted in the literature from the perspectives of home care, emergency and IR staff but lacking with non-radiology nurses and IR staff. Teamwork requires communication between non-radiology nurses and IR nurses and is especially important when patients leave their ward rooms to come to IR for a procedure.

Transition of Care

There is a lot of information in the literature surrounding communication concerns with patients travelling off the ward for radiology procedures. There was a dearth of literature exploring non-radiology nurses' experiences with patients leaving the ward for procedures. In Brazil, a standardized process of effective verbal and written communication was specifically created for the transfer of inpatients who were leaving the floor temporarily to improve

interprofessional communication and decrease adverse events associated with poor communication (Hemesath, Kovalski, Echer, Lucena & da Rosa, 2019).

Radiographers were interviewed in a study to elicit their thoughts about what placed patients at increased risk for safety incidents when coming to the radiology department (Wallin, Gustafsson, Anderzen Carlsson & Lunden, 2019). Wallin et al. noted a lack of communication between the radiology staff and health care providers particularly with the requisition not being completely filled out and the referring doctors not fully understanding the exams, the risks involved and how to prepare patients for the tests (2019). Patients come to IR with varying degrees of acuity and staff nurses are often notified on short notice when to send their patients for an IR procedure. Sometimes if patients require a continuous monitor while off the ward, the staff nurses are left to decide how to handle that situation. Ott (2015) discusses how nurse patient ratios and patient safety considerations influence this decision, then presents an off-monitor policy with a decision tree, that was created to support the staff nurse decision in case of an adverse event while the patient was off the ward.

When patients are finished having their procedure in IR, they either return to the pre-procedural inpatient ward or are discharged home with their caregivers. Communicating the specifics, for example, hemodynamics, medications and complications of what occurred during the procedure, as well as what to look for post-procedure is critical in promoting patient safety and positive outcomes. The IR team together develops a plan of care to include post-procedure monitoring, the provision of education and discharge planning, then the nurse ensures this information is communicated to non-radiology nurses, patients and caregivers (ARIN Clinical Practice and Research Committee & Laukhuf, 2017). Butler (2018) stressed the importance of communicating post-procedural care to everyone involved, the patients, their loved ones and the

staff receiving the patient to decrease the vulnerabilities associated with the handing off the transfer of care.

Handing Off

The safe transfer of inpatients from IR back to their hospital wards or medical facilities requires transferring the acceptance of responsibility of patient care or handing off the care to non-radiology nurses. This experience specific to IR was not captured in the literature. Handoffs involve communicating via verbal and written means accurate information, taking as much time as needed and is a reciprocal process with both the professionals who are sending and receiving the patient (Kear, Bhattacharya & Walsh, 2016; Grossman, 2017). The following barriers to an effective handoff were identified in a study geared specifically to handoffs and nephrology nursing practice: not sharing enough information, chaotic environments and interruptions, lack of time and nurse availability, unfocused attention and the perception of not being important (Kear, Bhattacharya & Walsh, 2016). There were a variety of reasons why information got lost, uncommunicated and miscommunicated and how "allowing the interruption-free space for empathetic listening, attention to task, in this case the conversation, followed by immediate documentation or relay of necessary information may have the potential to decrease errors" (Ott, 2017).

Summary

There was not extensive literature on the formal knowledge about the specialty of IR via nursing curricula and in-hospital training for nurses working outside the radiology department in Canada. A unique nursing program in Sweden was identified that educates nurses to become nurse radiographers and work only in the field of radiology. The National Institute of Radiological Sciences (NIRS) in Japan has guidelines to teach basic radiation knowledge as an

independent subject in their nursing schools. Two studies were found that discussed nursing experiences and IR. One was with community nurses in Ireland and the second was with nurses who work in IR in Sweden. Another study from South Africa investigated the experiences of both radiology and ward nurses with diagnostic imaging in its entirety. The findings from each of these studies showed a knowledge deficit relating to the specialty of IR.

Although multiple articles highlighted case studies to inform about the procedures performed in IR, the literature demonstrated that no official undergraduate nursing education specific to the procedures performed in IR exists in Canada. Various studies described patient, procedural and clinical experiences, as well as, nursing experiences about workplace and stress. The growing emphasis on clinical care of the IR patient was described in the literature from the perspectives of interventional radiologists and APNs. The importance of nursing assessment, collaboration and communication skills specific to IR were documented in numerous studies. These were discussed in terms of procedural knowledge, clinical care, transition of care and handing off. The literature neglected to provide a comprehensive understanding of non-radiology nurses' experiences caring for hospitalized IR patients in Canada.

Chapter 3. Conceptual Framework

A constructivist conceptual framework guided this inquiry which seeks an understanding of the experiences of non-radiology nurses and IR. As a radiology nurse who works in the IR department of the hospital, my role of caring for patients having IR procedures is different from the role non-radiology nurses working on other wards of the hospital have in caring for these patients. Based on my experiences, I have a strong personal interest in understanding the realties of what these nurses experience when caring for IR patients. Constructivism means we as human beings construct knowledge versus finding or discovering it and continually modify ideas and concepts that we have created to make sense of our existing and new experiences (Denzin & Lincoln, 1998).

> The aim of inquiry in *understanding and reconstruction* of the constructions that people (including the inquirer) initially hold, aiming toward consensus but still open to new interpretations as information and sophistication improve. The criterion for progress is that over time, everyone formulates more informed and sophisticated constructions and becomes more aware of the content and meaning of competing constructions. (Guba & Lincoln, 1994, p. 113).

A constructivist paradigm supports a relativist ontology which claims there are multiple realities "dependent for their form and content on the individual persons or groups holding the constructions" (Lincoln & Guba, 1994, p. 110). Constructivist thinking suggests that each participant in a research study comes with their own perspective, which in turn will represent a variety of different individual realities (Creswell & Poth, 2018; Cody, 2006; Lincoln & Guba, 1994; Glesne, 2016; Morgan, Gliner & Harmon, 2006). The non-radiology nurses who participated in this inquiry brought forth their own realties and shared insights from their day to

day real life experiences giving meaning to caring for IR patients from their individual perspectives.

In constructivist projects, researchers interact with participants in a mutual process of conversing, questioning and recording data (Kivunja & Kuyini, 2017). This process facilitates reflection and construction of many realities based on the actual experiences of these participants. Through this social interaction with the researcher, knowledge is constructed to include the researchers' personal experiences, subjective interpretations and the subjective experiences of the participants within a specific context (Kivunja & Kuyini, 2017; Creswell & Poth, 2018; Lincoln & Guba, 1994).

This subjective epistemological view supports new knowledge that is collectively reconstructed based on individual and shared consensus (Lincoln, Lynham & Guba. 2011). The individual experiences of the non-radiology nurses came together with the experience of the researcher to create a genuine representation of caring for IR patients in a hospital setting. New knowledge about caring for IR patients was co-constructed through this inquiry and the values non-radiology nurses strive to uphold were revealed. Cody (2006) notes a constructivist philosophical orientation is congruent with the nursing value of holism which in turn, was consistent with my findings.

The values and biases of a constructivist researcher are entwined in the narrative and results of the study (Creswell & Poth, 2018; Morgan, Gliner & Harmon, 2017, Kivunja & Kuyini, 2017; Milne & Oberle, 2005). "The social, dialogic nature of inquiry central to constructivist thinking…requires attending to both the inquirer's own self-reflective awareness of his or her own constructions and to the social constructions of individual constructions" (Schwandt, 1994, p. 242). To support the subjective nature of the inquiry, I considered my role,

values, beliefs, and assumptions about caring for IR patients and then was able to reflect openly on the experiences the participants shared with me. Making explicit my values and biases allowed me to explore the complexity of their experiences from their perspective to generate meaning. Ongoing acknowledgment of values, personal bias, history and experience through documentation in a reflexive journal allowed for transparency of the researcher.

Summary

Constructivism guided this inquiry to understand the personal perspectives and realities of each non-radiology nurse's experience in a mutual process with the researcher. With this framework a consensual view of realty and meaning of what it is like to care for IR patients was unveiled. Throughout the study the values of both participants and researcher were acknowledged and respected.

Chapter 4. Design

Qualitative Description

A researcher undergoes a reflection process "when considering what they want to study, also known as one's ontological positioning. This reflection links with one's epistemology or current knowledge about a particular area of study which influences what type of methodology is needed to generate the knowledge necessary to answer the research question" (Schwarz, 2016, p. 52). After careful consideration of my own ontological and epistemological positioning as stated in the above Chapter 3, I chose qualitative description methodology to guide this inquiry. I sought an understanding of non-radiology nurses' knowledge and perceptions of IR through descriptions of their experiences caring for IR patients. This method is especially suited "to obtaining straight and largely unadorned (i.e., minimally theorized or otherwise transformed or spun) answers to questions of special relevance to practitioners…" (Sandelowski, 2000, p. 337).

Qualitative description, which is rich and thick in detail and context, helps readers to understand the context of participants' experiences (Creswell & Poth, 2018; Glesne, 2016). A main element of qualitative description is "learning from the participants and their descriptions" (Bradshaw, Atkinson & Doody, 2017, p. 4). This was achieved by producing an accurate, rich description of non-radiology nurses' experiences. The beliefs, behaviors and perceptions of each participant were documented in this qualitative descriptive study to convey what Sandelowski (2010) described as 'what was really going on' for them. Exploring their experiences caring for IR patients, as they naturally occur, without "attempts to manipulate or interfere with the ordinary unfolding of events" maintains true representation of the qualitative descriptive approach (Colorafi & Evans, 2016, p. 18). This allows researchers to remain close to the surface of the data and describe events from participants' own viewpoints (Creswell & Poth, 2018;

Sandelowski, 2010; Lambert & Lambert, 2012; Neergaard, Oleson, Andersen, & Sondergaard, 2009).

Sandelowski (2000) states in qualitative descriptive studies "language is a vehicle for communication, not itself an interpretive structure that must be read" (p. 336). The writing of this language serves to "convey the depth of penetration into, or the degree of interpretive activity around, reported or observed events" (Sandelowski, 2000, p. 336). Remaining close to the data and detailing words and events using the participants' language ensures both descriptive validity, an accurate account of events; and interpretive validity, an accurate account of meanings that participants attributed to those events are achieved (Sandelowski, 2000; Willis, Sullivan-Bolyai, Knafl & Cohen, 2016; Neergaard et al., 2009). Limitations for generalization exist with the low-inference interpretation of the data as qualitative descriptive research better serves to understand the "who, what and where" of the phenomena with the presentation of 'facts' (Neergaard et al. 2009; Sandelowski, 2000). "The findings from qualitative description provide a basis for the transformation of taking richly described ideas, themes, or concepts from participants and developing them into pragmatic educational or behavioral interventions" (Willis et al., 2016). Neergaard et al (2009) note in-depth summaries of phenomenon that are not well known may expand our horizon of what we already know and stimulate future theory-based research.

This methodology is useful when the goal is to illustrate and increase understanding about human experiences where little is already known (Willis et al., 2016; Sandelowski, 2000; Sullivan-Boyai et al., 2005). Qualitative description was chosen because experiences of non-radiology nurses who care for IR patients are not well described or understood in the literature. There is a significant lack of qualitative studies about this topic to date. With the implementation

of this methodology for my study, awareness of the participants' practice caring for IR patients was described from their viewpoint and opportunities for knowledge development were revealed.

Research Questions

The research questions for this inquiry connect closely with the purpose of the study to explore and thoroughly describe non-radiology nurses' experience caring for IR patients':

- What do non-radiology nurses in hospitals learn about caring for IR patients in pre-service and in-service programs?
- What are non-radiology nurses' perceptions of what they need to know to provide safe care to IR patients in hospitals?
- What are their experiences when providing IR patient care in hospitals?

Sample

The purposeful sample for this study included ten non-radiology nurses employed at the Peterborough Regional Health Centre (PRHC) in Peterborough, Ontario, Canada. This sample included both registered nurses (RNs) and registered practical nurses (RPNs). They were selected because they met the key criterion of working outside the radiology department within PRHC; and each one had been involved in the caring of at least one IR patient. Purposeful sampling allows researchers to choose participants who will provide rich and unique information about the experiences under investigation which also contributes to the validity of the data (Bradshaw et al, 2017; Neergaard et al, 2009; Sandelowski, 2000; Richards & Morse, 2013; Milne & Oberle, 2005). A sample size of between eight to twelve participants can provide complete and adequate data (Sandelowski, 1995) and achieve saturation. Theoretical saturation is considered to occur in a qualitative sample when existing findings are established and no new

information is presented from the participants (Creswell & Poth, 2018; Glesne, 2016; Richards & Morse, 2013; Milne & Oberle, 2005). Data saturation was realized in this study with repeating categories and no emergence of new information.

There was variation to the sample with participants representing five different nursing wards within PRHC which contributed to the diversity of the sample. The maximum variation sampling was limited because the sample size of ten participants was not reflective of each non-radiology nursing practice area within PRHC.

Recruitment. Access to non-radiology nurses was available after obtaining ethical approval from both Athabasca University's ethics review board (see Appendix A) and PRHC's ethics review board (see Appendix B). General recruitment strategies were implemented. These strategies included speaking directly with the department educators and managers about the project to seek permission for them to display the recruitment poster. Direct communication with staff nurses informed them about the project and invited them to look for the posters in their respective departments. The recruitment poster included information about the research project, inclusion criteria, expectations of participants, receipt of a gift card and how the non-radiology nurses could contact the researcher if they were interested in learning more about the project and/or in participating (see Appendix C).

Nine of the participants expressed interest by contacting the researcher via email and one participant contacted the researcher via text message. A letter of information describing the study and an informed consent (see Appendix D) was provided to the participants via email after the participants expressed an interest in participating. Interviews were arranged for a date and time that was convenient for them following expressed interest and confirmed receipt of the letter of information. Each participant received a $20 Chapters Indigo gift card at the completion of the

interview as a thank you for participating. The recruitment posters were removed once the interviews were completed.

Sample Characteristics. Ten nurses employed at PRHC consented to participate in this study. Nine were RNs and one was an RPN. Four of the participants had worked at PRHC for many years and none of the participants were new graduates. They worked on a variety of acute care wards within the hospital. The nurses who contributed to this project ranged from novice to experts with varying degrees of experience and exposure to IR patients. The experiences they shared most commonly related to caring for IR patients post procedure. Novice nurses relied heavily on the knowledge of the more experienced nurses when providing care for IR patients either pre or post procedure. The nurses who worked on the surgical wards and the emergency department were exposed to a variety of procedures because of patient acuity and greater patient turnover. Other nurses who worked on the wards with less patient turnover tended to have frequent exposure to the same procedures.

Data Collection

Each participant was invited to engage in a one-hour long, face-to-face semi-structured interview. The interviews were conducted in a private space within the hospital to ensure confidentiality. Interviews were audio-taped so verbatim transcription could occur afterwards. Interviews began with introductions, a recap of the inquiry and signing of the informed consent. While each interview was scheduled for one hour, flexibility allowed for either more or less time to accommodate sharing of the participants experience(s). I was the sole investigator and I conducted all the interviews using the same interview guide (see Appendix E) (Colorafi & Evans, 2016; Bradshaw, Atkinson & Doody, 2017).

I transcribed each interview from the audio recorded tape. Each of these transcripts were password protected and stored on a USB stick in a locked container with the audio recorded tape. The participants were emailed their transcript and asked to review it to verify the information was represented accurately and within the sequence reported (Glesne, 2016; Sandelowski, 2000). Each participant communicated their approval and opted to keep a copy of their transcript.

Data Analysis

Data analysis is a flexible process that happens continuously and simultaneously from the collection of data to the writing of the findings (Creswell & Poth, 2018). Thematic analysis was used for this project to analyze the data from transcribed interviews to provide a rich description of themes that accurately reflected the data set in its entirety (Braun & Clarke, 2006). Thematic analysis works well with qualitative descriptive methodology which seeks to remain close to the data to achieve a rich description of participants' experiences (Creswell, 2018; Sandelowski, 2010; Lambert & Lambert, 2012; Neergaard et al, 2009). Braun and Clarke (2006) state this type of analysis is "particularly useful when you are investigating an under-researched area, or with participants whose views on the topic are not known" (p. 11), both of which were applicable to this study. A description of the analysis process: initial salient transcript reading, re-reading the data for gerund coding, in vivo coding and code weaving is included to show how the themes, that fully describe the participants' experiences, were identified.

Richards and Morse (2013) describe coding as a cognitive activity that moves data from "unstructured and messy to ideas about what is going on in the data" (p.149). Coding began with a salient read through each transcript to identify prominent views. Excerpts were taken and assigned words or short phrases to capture that datum's main idea. "The coding process involved

recognizing (seeing) an important moment and encoding it (seeing it as something) prior to a process of interpretation" (Fereday & Muir-Cochrane, 2006, p. 83). Table 1 illustrates an example of coded datum that I organized in the format described by Saldana (2009).

Table 1

An Example of Coded Datum from an Excerpt of a Transcript

Raw Data	Preliminary Codes	Final Code/Initial Category
"I guess that is up to every nurses' discretion of what they would choose to do. I would just try to troubleshoot my way through it"	Nurses' discretion choosing what to do.	Inconsistent practice. Individual comfort levels.

I read and coded one participant's transcript before moving to the second. This allowed a cyclical process where subsequent transcripts influenced the recoding of previous transcripts to "manage, filter, highlight, and focus the salient features of the qualitative data record for generating categories and themes" (Saldana, 2009, p. 8). Further coding of the transcripts occurred when I read through each transcript line-by-line and used gerunds to create the code words. Gerunds are words ending in 'ing' and allowed me to consider the data in terms of processes and actions (Glesne, 2016). Gerund codes are exemplified in Table 2.

Table 2

An Example of Gerund Coding

Raw Data	Gerund Code	Final Code/Initial Category
"I don't know what the nurse would report to us even if they did have communications. I feel like all they can say is it went well"	Not knowing. Reporting. Lacking communication.	Not understanding IR procedure.

Lastly, I used the exact words of the participants with in vivo coding to form code words and categories (Creswell & Poth, 2018). This enabled me to describe the perspectives of the participants within the context of their own language and processes. Fereday and Muir-Cochrane demonstrate "how overarching themes are supported by excerpts from the raw data to ensure that data interpretation remains directly linked to the words of the participants" (2006, p. 82). In Table 3, I have provided an example of in vivo coding from my coding chart.

Table 3

Sample of In Vivo Coding from Participant 8

Raw Data	In Vivo Code	Final Code/Initial Category
"for the more complicated ones I am always guessing"	"I am always guessing"	Guessing how to provide care for IR patients

Code weaving was used to create categories and groupings of codes after all the initial codes were established. This was accomplished with the writing and re-writing of code words and in vivo codes onto multi-coloured recipe cards then arranging and re-arranging them into

various groupings. Code weaving assists researchers as they consider how ideas interrelate and to generate further thinking and refinement of the data (Glesne, 2016; Saldana, 2009).

Memo writing and reflexive journaling occurred simultaneously throughout the analysis process to acknowledge the active role I had in ultimately determining and choosing the codes, categories and themes that held the most relevance. To discover themes while coding and categorizing, Richards and Morse (2013) emphasized that researchers must keep an abundance of reflective and detailed memos in an organized fashion.

Saldana (2009) noted a "theme is an outcome of coding, categorization and analytic reflection" (p. 12). I used an inductive approach to identify themes that were "important to the description of the phenomenon" and driven by the data themselves (Braun & Clarke, 2006; Fereday & Muir-Cochrane, 2006, p. 82). I created a thematic map to track the patterns and subsequent categories that arose from meticulously reading through the data many times. The themes were identified at a semantic level whereby low-inference interpretation was conducted to maintain the surface meanings of the data (Braun & Clarke, 2006; Vaismoradi, Turunen & Bondas, 2013). An example of significant excerpts, meanings and themes is shown in Table 4.

Table 4.

A Sample of Significant Excerpts, Meanings, and Themes

Significant Excerpts	Meanings	Themes
"not been any education about IR procedures" "I don't recall learning [about IR] a lot in class" "in school there wasn't a whole lot of education" "There isn't very much training…in the hospital"	Lack of formal education	Nursing Curriculum
"purely by experience here, I have never worked there [in IR] "I see more now in emergency…so definitely have more experience"	Nursing Experience	Acquired Knowledge

"I don't think I've been prepped as a nurse too well about the procedures they do in angios" "I have pretty much no knowledge to what happens [in IR]" "I didn't feel as confident cause I didn't know all these different procedures"	Increase Knowledge Build Confidence	IR Procedures
"If someone is gasping for breath that is a reason for me to call…it's purely advocating on their behalf" "there is nothing worse than when a patient asks, and you are like 'I don't know'" "I don't know what to tell patients" "they are scared too because they don't know what's going to happen either, so they look to us"	Advocacy Holistic Care	Build Trusting Therapeutic Relationship
"you have the pre-checked order set of what you need to do" "we won't be notified that it has or hasn't been done" "it would be more helpful to know what they have done more in-depth" "I felt like the person there didn't tell me anything that I needed to know but then I saw on my floor that my charge nurse was knowledgeable" "If we had any other procedure done there would be post-op orders, so they have to be there after any angio procedure, on every patient that comes, and we don't always get that."	Verbal and Written Communication	Continuity of Care
"I have no idea what goes on down there. I've never been a part of a procedure, I haven't seen what they do, it's like a bit of a mystery" "your area [IR] has been kind of isolated" "they go down to angios [IR], they come back but I don't know what happens down there. It's a mystery to me" "I don't even know how to get to angios [IR]" "it was very unfamiliar to me afterward, so I just asked the other nurses 'what are we looking for?"	Unfamiliarity Safe Patient Care	Overall Experience
"I have experience so I can be thoughtful" "we are still doing every 15-minute vitals when they come to the floor even though you have four patients, so every 15 minutes is not realistic" "relying on the assessment skills you already have and just kind of guessing what you are expecting for complications" "most of the nurses working in there [IR] are all experienced nurses…it is not an area you go to start off" "we are so specific now in our own little areas" "They sent the patient very early and they were bleeding a ton and I didn't know what to do so I held pressure and I got my charge nurse to call the surgeon…I would just ask my charge nurse if I was running into problems" "if the nurse didn't seem to give me enough of an explanation that I understood I would probably google it but past that I wouldn't have much time looking into it"	Specialized Nursing Care	

The low-inference interpretation of data inherent in qualitative description is consistent with a factist perspective that assumes data from the interview is accurate and truthful and the attitudes and behaviours of the participants are genuine (Neergaard et al, 2009).

Budget

I was awarded funding from the Dorothy Budnek Memorial Scholarship through the Association of Radiologic and Imaging Nursing (ARIN). This scholarship covered the costs for the research project in its entirety including, miscellaneous office supplies, recruitment posters and Chapter Indigo gift cards which were given to thank the participants for their participation (see Appendix F). The remaining money will be used to cover costs associated with dissemination of the results.

Ethical Considerations

The three core principles of research ethics: respect for persons, concern for welfare, and justice (Canadian Institute of Health Research et al., 2014) align with the following nursing ethical values:

1. Providing safe, compassionate, competent and ethical care.
2. Promoting health and well-being above all other goals including search for knowledge.
3. Promoting and respecting informed decision-making through informed consent.
4. Honouring dignity.
5. Maintaining privacy and confidentiality.
6. Promoting justice and evaluating the risk-benefit balance.
7. Being accountable. (Canadian Nurses Association, 2017, p. 3).

Ethics is intrinsic to the constructivist conceptual framework that guided this study. The individual and nursing values of both myself and nurse participants are included in this inquiry (Lincoln, Lynham, & Guba, 2011).

Ethical considerations were implemented using the four principles of: privacy; accuracy; property and accessibility (Kivunja & Kuyini, 2017). The privacy and confidentiality of all ten participants was considered throughout the study and anonymity was maintained because no personal identifiers were used. Participants were not forced in any way to give information other than what they were comfortable sharing and were made aware that they could withdraw from the study at anytime without consequence.

Full disclosure of the purpose of the study and the proposed use of the results was given to the participants during introductions including my position in the hospital as an IR nurse to avoid deception. I was not in a position of authority over the participants and the academic nature of the study to fulfill the requirements of a master's degree in nursing was explained to avoid conflicts of interest or power over the participants. Written informed consent was obtained from each nurse participant before any research activities commenced.

Direct quotations from participants were used in the findings of this study to increase accountability and are important in qualitative descriptive studies "to keep as near to the participants' meaning as possible by using their own words"(Bradshaw et al., 2017, p. 6). Participants were given their transcribed interview and the results to check for accuracy of the information they provided. Participants were assured the property of the data will always be kept safe through the storage of hard data on a USB flash drive for a period of five years in a secure, locked file. The transcribed interviews are on a private, password protected computer.

Anonymity will be sustained to the dissemination of the research findings as the data that is reported or publicized is aggregated and anonymous with no use of participant identifiers.

Trustworthiness

Trustworthiness in qualitative research demonstrates that the quality of the data and the findings of the study represent the truth of the participants' experiences (Colorafi & Evans, 2016; Bradshaw et al, 2017). Trustworthiness was established in this inquiry with the following four criteria: credibility, confirmability, dependability and transferability (Colorafi & Evans, 2016; Bradshaw et al, 2017; Glesne 2016; Lincoln & Guba, 1985).

Credibility. To establish credibility of a qualitative study many techniques are utilized to promote authenticity and criticality. Authenticity is the ability to remain true to the phenomenon under study; and criticality or integrity is the attention paid to each and every research-related decision (Milne & Oberle, 2005).

Authenticity was upheld in this study with the purposeful sampling of ten non-radiology nurses who spoke freely about their experiences caring for IR patients. It was important to me to provide a warm and friendly environment to establish rapport before the interview; to demonstrate a willingness to exchange information with the participants; to build trust and; to show kindness and compassion throughout the interviewing process (Bradshaw et al, 2017). This was facilitated by asking open-ended questions and probing for clarification and depth to prevent superficial data. Using open-ended questions and probing sub-questions during the interview allow the participants to speak freely and to gain a deep, true reflection of their perspectives (Neergaard, 2009). I exercised active listening and avoided interrupting the participants to ensure the voices of the participants were being heard while at the same time exchanging dialogue. An

accurate account of the participants' perceptions and meanings is crucial to attaining credibility of the study (Neergaard, et al, 2009; Sandelowski, 2000).

To further ensure that I had accurate representation of the participants' perceptions, I implemented two member-checking strategies. Member-checking or participant validation is a credibility enhancing technique used in qualitative research where "data or results are returned to participants to check for accuracy and resonance with their experience" (Birt, Scott, Cavers, Campbell & Walter, 2016, p. 1802). My first member-checking strategy was to return the interview transcripts (data) to participants. This strategy allows participants to reconstruct any comments they felt were negative or that did not represent their experience (Birt et.al). Only one participant returned their transcript following a complete grammatical edit but with no changes to the content. My second strategy was to provide participants with a summary of my findings. The summary of my findings included the participants' direct quotes and full descriptions of the six themes that I derived from coding and categorizing the data. Here, the purpose was to "explore whether results have resonance with" participants' experiences (Birt et.al. p. 1805). All participants in the study agreed that the interview data and that the summarized findings were accurate.

Criticality within this study was achieved with consistent review of each research decision from conception of the idea to the completed project. My thesis supervisor, committee members and various professors shared their expertise and knowledge about qualitative research throughout this process and supported the overall integrity of the study with their peer debriefing. To further promote the integrity of this project I participated in ongoing reflection of my biases via memo writing and journaling. Direct quotes from the participants were also included to reduce researcher bias (Bradshaw et al, 2017).

Confirmability. Confirmability refers to the degree to which findings from the research are clearly derived from the data and how they could be confirmed by other researchers (Lincoln & Guba, 1985). All personal thoughts and ideas relevant to the research process were documented in my reflexive journal. A transparent audit trail of data collection, analysis and presentation processes recommended by Colorafi and Evans (2016) and Bradshaw et al. (2017) was accomplished with the use of the transcripts, coding charts, thematic maps, memo writing, word documents and a power point presentation.

Dependability. Dependability refers to the stability of findings over time and involves participants' own evaluations of the interpretations of the study (Lincoln & Guba, 1985). The audit trail contributes to the dependability of the project as does the previously mentioned member checking. To achieve further dependability, I remained the sole investigator conducting the interviews; consistently used the same interview guide with each participant; and documented and accounted for any changes that happened during the study (Colorafi & Evans, 2016; Bradshaw et al., 2017).

Transferability. Transferability refers to the degree to which the results of qualitative research can be transferred to other contexts or settings (Lincoln & Guba, 1985). Transferability can be facilitated by thick description, which means not only describing participants' behaviors and experiences, but extending those descriptions to include accounts of their contexts in ways that resonate and become meaningful to outsiders as well (Lincoln & Guba, 1985). The findings of this study highlight the participants' experiences and the discussion elaborates on these experiences to identify suggestions for future nursing practice and indications for future research, which Colorafi and Evans (2016) assert will aid with transferability.

Limitations

The limitations of this study included no triangulation of data sources; a lack of prolonged engagement with the participants; no ability to generalize findings from maximum variation sampling and low-inference analysis. Interviews were the sole source of data which significantly impact triangulation (Creswell & Poth, 2018). Data collection occurred with a single meeting to conduct an approximate one-hour long interview. There were no further face-to-face meetings to engage in conversation about the participants' experiences. Ten non-radiology nurses who represented five different areas of nursing within the hospital made up the sample for this inquiry.

> For small samples, a great deal of heterogeneity can be a problem because individual cases are so different from each other. The maximum variation sampling strategy turns that apparent weakness into a strength by applying the following logic: Any common patterns that emerge from great variation are of particular interest and value in capturing the core experiences and central, shared aspects or impacts of a program…The evaluator using a maximum variation sampling strategy would not be attempting to generalize findings to all people or all groups but would be looking for information that elucidates programmatic variation and significant common patterns within that variation. (Patton, 1990, p. 172)

This sampling strategy was reasonable for this qualitative descriptive study that sought to gather information about caring for IR patients to enhance nursing practice; inform both pre-service and in-service nursing education initiatives; and to increase overall awareness of the specialty of IR. However the ability to generalize the findings is restricted as a result. This methodology strives to keep the data factual and close to the surface, therefore in-depth analysis was not attained. The

nature of this low-inference analysis also inhibits the ability to generalize the findings (Neergaard, 2009). However, comparisons can be drawn, and re-creations can happen if rich, thick description is achieved and enough information about participants and sample size are provided (Colorafi & Evans, 2016; Bradshaw et al, 2017).

Summary

Qualitative description methodology was the research design used to answer the questions I proposed for this inquiry. A purposeful sample of ten non-radiology nurses' from various nursing departments within the hospital were recruited. Face to face interviews were conducted with each participant to collect the data. Detailed coding, categorizing and theming of the data followed during data analysis. The overall budget was presented. Ethical considerations were identified and the four criteria: credibility, confirmability, dependability and transferability that establish trustworthiness were discussed. The following limitations that qualitative descriptive studies are susceptible to were also acknowledged: triangulation of data sources; a lack of prolonged engagement with the participants; generalization of findings from maximum variation sampling and low-inference analysis.

Chapter 5. Results

The findings from the data analysis were categorized to link with the research questions: what do non-radiology nurses in hospitals learn about caring for IR patients in pre-service and in-service programs; what are non-radiology nurses' perceptions of what they need to know to provide safe care to IR patients in hospitals; and what are their experiences when providing IR patient care in hospitals. Six themes were identified: nursing curriculum, acquired knowledge, IR procedures, build trusting therapeutic relationships, continuity of care and non-radiology nurses' overall experience. These are explained below.

Nursing Curriculum

Most of the participants indicated that there was no formal education about IR provided within their undergraduate nursing programs. The opportunity to learn about IR procedures that are performed in the IR department during either the theoretical or clinical practice portions of the nursing curriculum did not exist. One nurse mentioned the lack of training within the hospital. Another nurse made this comment:

> *I don't have a lot of knowledge on the IR department, like who is getting conscious sedation and who isn't…nobody has ever said to me well this is what they do in the IR department, this is what they need…I don't really feel like that has been a formal part of our education, it is just on the fly, wondering what they need.* (Participant 8)

Two nurses reflected on an IR procedure that involves the placement of a percutaneous drain. They attributed their lack of knowledge and understanding about the different types of drains to not learning about it in school. Their learning to date was from patients.

> *Not understanding how they are using it or why the tube is inside or where they are really located and like the different types of tubes inside because I don't really know there is a difference but I believe there are, from different patients saying they are getting different things.* (Participant 3)

The nurse was learning about different drains through caring for the patients who had them.

Non-radiology nurses talked about working with many new graduate nurses who have no experience and no awareness of the IR procedures and *"all the risks associated, as there has not been any education about IR procedures, so we are having to do a lot of teaching"* (Participant 4). This was echoed by a nurse who commented *"I think the junior nurses still need to be guided on everything. They don't know you know, and all of our learning is experienced based, that is just the way it is pretty much"* (Participant 5).

Acquired Knowledge

There was consensus from the participants that the knowledge acquired about IR procedures was gained from experience. They attributed it to the frequency with which they cared for patients having procedures. *"The knowledge comes from where you work…what types of patients you see would be the types of procedures. It is all experienced based, I honestly feel"* (Participant 5). The nurses who worked in departments with higher turnover, for example, the emergency department, and nurses who had worked for a long period in one department reported having the most experience with IR patients. Non-radiology nurses who lacked experience caring for IR patients deferred to the nurses who had more experience.

> *It depends on how common the procedure is. I would ask a more senior staff but when it happens less often, they are not sure either; so we are figuring it out all together, so you rely on your colleagues a lot for sure.* (Participant 6)

One nurse *described "relying on the assessment skills you already have and just kind of guessing what you are expecting for complications"* (Participant 6). There was not much discussion about IR amongst non-radiology nurses throughout the different departments within the hospital. They felt it is an area that you either had exposure to or not.

IR Procedures

Many nurses expressed an interest in knowing how IR works in general and the need for any type of formal education about the specific procedures done in IR. Most of the non-radiology nurses expressed the need to have current, written resources available to them that clearly document what is required from them in terms of preparing their patient for the procedure. Nurses highlighted the need for this because it would increase their knowledge, avoid confusion and increase their confidence.

> *You are just kind of googling the procedure, it is not like you are getting it from an actual source especially because hospital to hospital could be completely different and like person to person can be completely different. I'm not too knowledgeable about it all.* (Participant 9)

> *It gets confusing, the whole pre-procedure for sure gets confusing on what the expectation is for us and what we need to get the patient ready unless you have had a lot of experience with different procedures and patients and you have been here for a long time.* (Participant 8)

> *Initially I didn't feel as confident because I didn't know all these different procedures and all these drains and all these things so like a little seminar beforehand would have been helpful just to boost my confidence…then going in you feel more confident in yourself and your nursing skills.* (Participant 1)

The nurses suggested the following hospital specific documents that they would find beneficial when caring for their patients: reference sheets, check lists, handouts, charts and self-learning packages accessible on the hospital's intranet or placed at the nursing station.

Non-radiology nurses expressed the need to know what happens during the procedure to safely care for their patients afterwards. The desire to accommodate the needs of visual learners by observing a procedure in its entirety was voiced by one participant.

The perception of what non-radiology nurses need to know to provide safe care also pertained to caring for the patient after the procedure.

> *I have a very rudimentary understanding of what those procedures are…what is running through my mind is what kind of assessments do I need to do…having more knowledge about the procedure means that you can better understand, oh they had this procedure so after actually, I would be more worried about that, so being able to discern better to watch for those complications. I don't know if I'm doing the greatest job if I do not have that knowledge.* (Participant 6)

Build Trusting Therapeutic Relationships

Non-radiology nurses are present with the patients and often their families 24/7; are empathetic to how their patients are feeling; and do everything they can to alleviate their patients' discomforts. These nurses working with the patients before and after their IR

procedures verbalized the desire to understand more about what happens when the patients are in the IR department so they can explicitly communicate the process to the patients and families.

Holistic care. Holistic nursing involves taking care of the whole patient including their psychosocial needs. Non-radiology nurses need to be able to alleviate their patients anxiety and provide emotional support about their upcoming procedure. One nurse commented:

> *I really don't know much about it because I never worked in an area like that before. I just know little bits and pieces…I find it challenging sometimes because more patients are going down for procedures and they are scared too because they don't know what's going to happen either so they look to us like what's going to happen when I'm down there?, what are they going to do?, am I going to be awake or asleep? Sometimes it is hard to know with certain interventions so it scares a lot of people and a lot of people get anxiety...so, it is trying to keep the patient at ease and having that anxiety down but it would be nice to be a little more informative to let them know exactly what is going to happen other than we are sending you down, the nurse down there will care for you.* (Participant 7)

Another nurse expressed frustration with not knowing what to tell patients and having to defer their questions until the patient could speak with staff who work in the IR department.

Patient advocacy. Inpatients who are being cared for by non-radiology nurses are often symptomatic prior to their procedures. Advocating on behalf of the patients and their families is a primary role for these nurses. Timely communication of their patients' needs to the most responsible physician (MRP) and ultimately to the IR department is essential to building a trusting relationship with their patients. Most of the participants described the difficulties they

experienced with not knowing when their patients' procedures were going to happen. *"It might be a week or longer for patients to get their procedures so that effects us and our patient care…we are all connected"* (Participant 7). Also, having to witness their patients' ongoing distress that delays in treatment created for their patients and families was difficult. *"It was delays in getting a procedure done and the patient suffering…the patient was brought right down to the doors of IR and turned back because something else was happening"* (Participant 2). This created tension between the nurses, patient and family making it difficult to maintain a trusting therapeutic relationship.

Continuity of Care

All nurses who transfer patients between the inpatient wards and the IR department are responsible for the safe transition of care for these patients. This occurs at PRHC with a signing of a transfer of accountability form by both the sender and receiver of care after the exchange of a verbal report. This interaction is referred to as handoff in the literature. This exchange of information can occur either verbally or with written documentation.

Verbal communication. All the non-radiology nurses brought up communication when describing their experiences and perceptions of caring for patients in the hospital who had an IR procedure. The most common experiences involved the amount of information that was exchanged surrounding what happened during the procedure. Many nurses echoed the thoughts of this participant when she said:

> *I think the information is limited when I go to pick up the patient because I don't really have the knowledge base to begin with. I don't really feel like there is a lot of detail about the procedure like what they've done, if there were complications. I may know something*

> *general like if they weren't able to stent the patient because the artery is too blocked, but it is basic and very general. Most of the information I'm getting is just on the recovery phase. How many vitals are left to do when they are off bedrest. We kind of just go over the post angio order set as opposed to the details of the procedure of what <u>really</u> happened during the procedure.* (Participant 8)

According to the participants, the information shared verbally between the sending and receiving nurse varied. One nurse described feeling more comfortable to ask specifics about the procedure if they knew the IR nurse personally. One other nurse talked about how she felt the IR team made assumptions and had expectations that *"you should know what they are talking about, but you don't necessarily"* (Participant 9). One nurse made the comment *"I don't think I've ever had any issue, not something worrisome in my mind with the lack of report or the communication between the two teams"* (Participant 3). Having in-depth knowledge of what occurred during the procedure as explained by the IR nurse reportedly helped non-radiology nurses focus their assessments to provide post-procedural care, observe for complications, achieve positive patient outcomes and provide their patients with accurate information.

Written communication. When patients have more complicated procedures in IR, non-radiology nurses receive them post-procedure with standard doctor's orders that outline specific nursing tasks that need to be completed and documented. Most of the participants described the post-procedural handoff from the IR nurses as a review of these written orders prior to returning the patient back to the floor.

Not all procedures have standard written post-procedure orders. One nurse verbalized her experience with this by explaining the frustration of having to take time away from the patient to

repeatedly call the radiologist to fulfill their responsibility of documenting the post-procedural care of the patient that is standard for all hospital services.

A couple of non-radiology nurses mentioned having to look up the radiologist dictations in the absence of receiving a verbal report after a procedure. This was not satisfactory when patients were continuing to have symptoms because it created delays in patient care. More than one participant also commented on the inability to reach anyone in the department by telephone when needing to speak with someone with either a pre-procedural or post-procedural concern.

Non-Radiology Nurses' Overall Experience

"Unacquainted", "uninformed", "unaware", "unskilled", "inexperienced" were terms that accurately described non-radiology nurses' overall experiences with IR. When these concepts were further explored with the nurses they shared in detail how the IR patient care they provided was affected by being unfamiliar with IR; the frustrations with the desire to provide safe patient care; and the influence of specialized nursing care.

Unfamiliarity with IR. There was consensus about the unfamiliarity of the IR department amongst non-radiology nurses, particularly with regards to the procedures performed. Two nurses used the expression *"it's a bit of a mystery"* to describe their experiences with the IR department and the procedures that are done there (Participant 8; Participant 10). The nurses were rarely exposed to the IR department because the hospital porters often transfer the patients from the inpatient wards to their procedures. They described their presence in the IR department as being restricted to the recovery area where they came to transfer their patients back to their inpatient room. Another nurse commented *"you don't know what you don't know. I learned as I went"* (Participant 5). Most of the non-radiology nurses noted that anything they did know about

the IR department and the procedures was gained from patient experiences and exposure to the IR department over time.

Safe patient care. The concerns for patient safety were adamantly communicated when a few non-radiology nurses described recovering patients after having a vascular IR procedure. They explained how difficult it was to perform vital signs every 15 minutes during the initial recovery phase when they experienced higher nurse patient ratios. They clearly illustrated the inability of being there every 15 minutes when one of their other four or five patients may have also just arrived or needed them urgently. They pondered how this could be potentially unsafe for their patient because it creates the potential to inadvertently miss a post-procedural vascular check.

Two nurses talked about how unprepared they felt when they received patients indirectly. They explained that this happened when a patient came to them from the emergency department via their procedure in the IR department.

> *She went from ER to IR. She was way over sedated for my unit, she wasn't breathing. It was terrible. We ended up giving Narcan and I called the critical response team. She just should have been recovered properly, not back up on the floor. There is no preparation, like she came from emergency to there, then up to the floor.* (Participant 5)

Some nurses expressed the desire to have standardized care plans for post-procedural care to eliminate errors and ensure patient safety.

Specialized nursing care. Three nurses observed when working in the hospital that nurses became specific and focused on their area of specialty. They expressed the desire for more collaborative practice in becoming knowledgeable about the patient population other

departments cared for and what they do for those patients. It was mentioned that feelings of frustration were alleviated when nurses understood the IR process. Non-radiology nurses did not perceive there to be a reciprocal relationship with IR. This was identified by acknowledging that they would not think to notify the interventional radiologist if a complication arose. It was also communicated that IR personnel had primarily a procedural focus and did not always consider how that impacted the overall management of the patient. Two participants who were more experienced did mention that they had on occasion called IR to have their questions answered or to seek doctor orders.

Patients who have IR procedures, such as insertion of a percutaneous drain are discharged home from the inpatient wards. One nurse said

> *we have lots of patients that ask When I go home what is going to happen? What are they going to do? So it would be nice to have more of that information and the proper techniques of how to properly care for the drain, like complications that can happen.* (Participant 7)

Patients and families needed specific procedural education upon discharge. IR staff needed to disseminate this information to non-radiology nurses so they could provide their patients with effective discharge teaching.

Summary

The data collected from ten interviews with non-radiology nurses were multifaceted and rich in detail. Six themes emerged from the analysis: nursing curricula; acquired knowledge; IR procedures; building trusting therapeutic relationships; continuity of care; and non-radiology nurses' overall experiences.

The nurses discussed formal education in the nursing curricula. They all described their lack of knowledge about IR procedures and commented that they did not receive any formal education in their nursing curriculum or in hospital. The nurses discussed their role in teaching new graduate nurses and junior nurses about caring for patients having IR procedures.

There was consensus amongst the nurses that the knowledge they had about IR procedures was gained from experience. Experience was gained from the frequency with which they cared for patients and the length of time they have worked in their specific departments.

Many nurses expressed the need for any kind of formal education relating to IR procedures. They felt this education would increase their knowledge, avoid confusion and increase their confidence in caring for patients having an IR procedure. They suggested creating hospital specific documents such as reference sheets, check lists, handouts, charts and self-learning packages to help them achieve this. Nurses also communicated what they would like to know before, during and after the procedures to provide the safest nursing care.

Building trusting therapeutic relationships with both the patient and their families was a priority for non-radiology nurses. This required a deep understanding of the procedures performed in IR and timely communication with IR staff to advocate for these on behalf of their patients.

Communication in both verbal and written forms to transfer accountability of patients between their inpatient wards and the IR department was also described. The nurses talked about the limited amount of information they received specific to what happens during the procedure. They also mentioned how time consuming it could be for them to have to chase after information

if orders were not written, when report was not communicated and when procedural processes were not documented.

The overall experiences of non-radiology nurses were portrayed by the concepts of being unacquainted, uniformed, unaware, unskilled, and inexperienced with IR. They elaborated on these concepts to denote how being unfamiliar affected patient care; how frustrations built to provide safe patient care; and how specialized nursing care influenced the care they gave.

Chapter 6. Discussion

Create IR Nursing Specialty Education

The procedures in IR depend on the latest technological advances. This inquiry reinforces the existence of a knowledge barrier unique to IR because of the technical use of multiple imaging modalities, such as CT, fluoroscopy and ultrasound. This was evidenced in the data when non-radiology nurses spoke about their experiences sending patients for a diagnostic CT scan rather than the experiences caring for patients who had undergone an IR procedure. This demonstrated a lack of understanding that IR procedures are a separate entity from a diagnostic CT scan. Another knowledge barrier unique to radiology surrounds the use of ionizing radiation. The lack of knowledge about radiation safety for both radiology and non-radiology nurses has been well documented in previous studies (Thambura, Vinette & Klopper, 2019; Shimizu, Lido & Nenoi, 2019; Babaloui et al., 2018).

IR is leading edge for technologically advanced minimally invasive procedures. The demand for hospitalized patients to have IR services is ever increasing, as are the complexities of the hospitalized patients who require them. According to the literature, Canada was not amongst the countries that offer formal education specific to IR through undergraduate and post-graduate nursing curriculums. As documented in the findings from this study there are no formal pre-service or in-service educational opportunities about IR or IR procedures for non-radiology nurses who work at PRHC. This is consistent with previous literature that reports the significant lack of nursing education focused on the specialty of IR (Powell, 2007; Farrell & Halligan, 2017; Penzias et al., 2015; Sousa, 2011; Mustonen, 2016). This descriptive inquiry revealed that non-radiology nurses need and desire IR education and clinical experiences during their formal schooling to enable them to provide safe quality care for their IR patients. Existing literature

echoes the notion to develop undergraduate nursing curriculum and hospital in-service education for non-radiology nurses to support their roles in optimizing patient outcomes with the continued advancement of the specialty services of IR (Farrell & Halligan, 2017; Sousa, 2011). The most common suboptimal outcomes cited by the participants were post-procedure complications, ineffective discharge teaching, emergency visits post discharge and readmissions to the hospital. Further research investigating patient outcomes after IR procedures would be of interest.

All non-radiology nurse participants discussed how they were most familiar with post-procedural care. Their ability to prepare patients for procedures was impeded because they did not have clear, consistent direction or information about what was required of them. They described how this lack of information negatively affected their confidence when they needed to interact with their patients about their procedure. They acknowledged how helpful a written resource for pre-procedural care would be and suggested multiple ideas of what form this could take. Formal education about IR procedures and specific in-hospital resources outlining best practice for pre- and post-procedural nursing care would greatly aid non-radiology nurses when caring for IR patients' and help to increase awareness about IR.

Increasing Awareness

A "mystery", an "unknown entity" and "unfamiliar territory" are terms non-radiology nurses, community nurses and other authors have used to describe the specialty of IR (Farrell & Halligan, 2017; Potter, 2015; Kelly, 2013; Potter, 2007). The accredited certified radiology nurse (CRN®) program recognizes nurses for achieving in-depth knowledge and a standard of competency in the specialty of radiology (Radiologic Nursing Certification Board, 2020). This certification is administered by the Radiologic Nursing Certification Board, Inc. (RNCB) in the

US. Including myself there are only a handful of nurses in Canada who possess this designation which supports the need for increased awareness about this specialty area of nursing.

The non-radiology nurses in this study reported either limited or no physical contact with IR staff or the IR department in the hospital. Lack of IR exposure extends from in-hospital to a broader invisibility through provincial associations. The Registered Nursing Association of Ontario (RNAO) lists multiple interest groups to which IR nursing is not one (RNAO, n.d.). The College of Nurses of Ontario (CNO) does not offer IR nursing as a clinical practice option on the annual renewal form. Kelly noted this was also the case with the provincial renewal form in Alberta (2013). Non-radiology nurses concur that the specialty of IR nursing and the skills required to care for this client population need to extend beyond the doors of the IR department throughout the entire hospital. Increased awareness of the IR procedures would benefit non-radiology nurses as they work to develop a trusting therapeutic relationship with their IR patients.

Therapeutic Nurse-Patient Relationship

There are numerous procedures performed in IR for diagnostic, therapeutic, palliative and curative purposes. Non-radiology nurses provide around the clock care for patients receiving these procedures for all the reasons stated above. They emphasized how not understanding these procedures interfered with the ability to provide holistic nursing care because they were unable to answer questions and alleviate patients' anxieties about what the procedure involved. Bagnasco et al. (2020) reported the emotional and psychological needs of patients on medical and surgical wards were not being met. They noted the importance of meeting these needs of patients to ensure holistic nursing care is provided. Without prior clinical experiences or knowledge of the various IR procedures the nurses put off answering their patients' questions

suggesting they ask the IR staff upon arrival to their procedure. This interfered with the development of a therapeutic relationship with their patients. Many participants expressed frustration with this practice and felt they would benefit from a hospital specific written resource outlining the different IR procedures that could serve as a quick reference.

In-hospital orientation sessions were also suggested by the participants to increase their knowledge about the procedures performed in IR. Studies have been done with regards to IR specific orientation outside Canada but I did not identify any literature about IR education programs geared to non-radiology nurses working in the hospital (Gill & Shanta, 2019; Vlach, 2018; Jeffery & Werthman,2015; Penzias et al, 2015; Sousa, 2013; Cefaratti, Benninger & Nguyen, 2013; Clark & McClain, 2004). Future studies exploring in-hospital resources and education programs specific to IR for non-radiology nurses in Canada would be beneficial.

Non-radiology nurses working on hospital wards are the link between inpatients and IR. Not being privy to the IR schedule or when the IR schedule might suddenly change to accommodate a patient with a higher priority need creates the potential to have a detrimental effect on the nurse patient relationship. This is because nurses advocate on behalf of their patients to get timely procedures and patients trust their nurses to give them accurate information about when their procedure will happen. Feelings of stress and frustration accompany these nurses when the IR schedule changes. This is because non-radiology nurses are present with their patient as they continue to experience anxiety about the procedure, underlying and often distressing pre-procedural symptoms; and uncomfortable procedural preparations, for example, not having anything by mouth for prolonged periods of time. The participants in this study seek improved understanding of IR and improved coordination of patient care. Hassmiller (2015)

states "studies have demonstrated that effective coordination and communication among health professionals can enhance the quality and safety of patient care" (p. 128).

Quality Patient Care

IR having such a strong technological focus combined with limited time for patient interaction can potentially cause a narrowed view of the patient's overall picture. Interventional radiologists in Canada perform procedures primarily through a referral service. The degree of clinical involvement with the patient varies depending on IR personnel and hospital supports such as interventional radiologist having admission privileges. Zener et al. (2018) note 46% of interventional radiologists working in Canada have admitting privileges. Other countries have embraced the clinical management of their IR patients. For example in China, IR has both procedural suites and designated in-hospital beds created solely for their IR patients (Xu, Wang & Cheng, 2019).

Continuity of patient care is compromised when interventional radiologists do not oversee the clinical management of their patients. Non-radiology nurses stated that they do not initially think to notify the interventional radiologist with respect to concerns about their patient before or after having an IR procedure. They will notify the MRP which creates an indirect line of communication and ample opportunities for important procedural information to get miscommunicated or not communicated at all. This can result in either patients not being prepared properly for their procedures compromising the efficiencies of the IR department or complications that lead to further procedures and negative patient outcomes occurring. Non-radiology nurses expressed concerns for managing the patient's bigger picture and how the procedure impacts the care of the patient when there were multiple physicians involved with the

patients care. They attributed this to a lack of communication and follow-up between themselves and the IR staff relating to the patients' clinical condition.

Advanced nurse practice roles are rooted in the nursing model, for example, CNSs have been introduced into IR to provide specialty based expertise; collaboration about policy, procedure and practice; consultation about care needs before and after procedures; coaching, education and incorporating new and existing research (Penzias et al., 2015; Muehlbauer, 2011). CNSs in IR serve as an essential multidisciplinary and interprofessional liaison with the rest of the hospital and serve to alleviate confusion and improve communication for patients and team members.

Communication and Collaboration

There was consensus among the non-radiology nurses about the lack of communication they received relating to the details of what occurred during the procedure. The information they received post-procedure provided an overview of the procedure and usually included going through the written doctor's orders. Intra-procedure hemodynamics, descriptions of how the procedure was performed and complications were often not routinely communicated during the transfer of accountability. Non-radiology nurses discussed how they did not have a deep understanding of the procedures, so they either did not know what to ask or felt uncomfortable asking the IR nurses unless they knew them personally from working with them in the past. This lack of knowledge and confidence creates a barrier to communication. With the lack of any formal education, non-radiology nurses stated the knowledge they do have was gained from the brief transfer of information they received from the IR staff and from previous experiences caring for other patients having IR procedures.

Experiences of non-radiology nurses caring for IR patients varied depending where they worked and the frequency with which they saw patients. Nurses who worked on the wards where there was a higher turnover of patients had more experience and nursing skill. Non-radiology nurses who had little experience expressed how they depended on the more senior staff to support their practice. A general lack of knowledge and sporadic staff experiences with IR procedures contributes to non-radiology nurses' safety concerns. Not knowing lends itself to post-procedural tasking versus applying nursing assessment skills which can result in missing early signs of post-procedural complications. This is consistent with the analysis done by McClaren and Scarbrough (2015). They too found that the lack of IR procedural knowledge the ward nurses had directly contributed to post-procedural complications.

There was consensus amongst non-radiology nurses that they would benefit from knowing more about the intricacies of the patient populations on the different wards throughout the hospital. Enhanced collaboration would increase awareness of the realities and certain needs of the different patient populations including the nurse-to-patient ratios on the in-hospital patient wards. One of the main challenges these nurses expressed was having to perform the vital signs every 15 minutes as part of the initial recovery after the IR procedure because of the high nurse-to-patient ratios. They expressed the nurse-to-patient ratios in their departments were not conducive to recovering patients and raised significant safety concerns for their patients

Unawareness of IR procedures and the related potential complications impact the teaching non-radiology nurses provide patients and caregivers prior to discharge. It is imperative that this education be clearly delineated for patients to be successful at home. Lack of education and knowledge about percutaneous drains placed in IR extends into the community as evidenced by a study done in Ireland by Farrell and Halligan (2017). This accentuates the need for

improved collaboration efforts between IR, non-radiology nurses and community care nurses with regards to discharge planning. Further research investigating discharge planning and IR procedures in Canada is highly recommended.

Summary

This study has highlighted the need for IR specialty nursing education initiatives in both pre-service nursing curriculum and in-hospital education programs. The complete absence of any IR education was detailed by non-radiology nurses through their experiences caring for IR patients. Awareness of the specialty of IR can be increased with the introduction of provincial and national organizations as forums for nurses to discuss IR nursing in Canada; with the introduction of CNSs to liaise between disciplines; and with hospitals granting interventional radiologists admitting privileges to increase their clinical involvement with IR patients.

Non-radiology nurses are essential to caring for patients before and after IR procedures. They need to be granted the clinical resources to develop their abilities and confidence in caring for patients having IR procedures. Interprofessional collaboration and communication needs to be improved and extended to incorporate them as integral members of the patient care team to ensure optimal patient outcomes.

Chapter 7. Conclusion

A qualitative descriptive inquiry guided by a constructivist framework was used to explore: what do non-radiology nurses in hospitals learn about caring for IR patients in pre-service and in-service programs; what are non-radiology nurses' perceptions of what they need to know to provide safe care to IR patients; and what are their experiences when providing IR patient care in hospital. Ten non-radiology nurses who work at PRHC were recruited via posters and direct communication. They all participated in an individual face-to-face, semi-structured interview. Representation from five different nursing wards contributed to variation in the sample.

Thematic analysis was done using low-inference interpretation to gain rich descriptions of the participants' experiences which resulted in six themes: nursing curriculum, acquired knowledge, IR procedures, building trusting therapeutic relationships, continuity of care and non-radiology nurses' overall experiences. These themes reflect a deep understanding of non-radiology nurses' experiences caring for IR patients in a Canadian hospital. Suggestions for in-hospital resources, curriculum development and future research are discussed to help bridge the IR nursing knowledge gap.

Credibility of this study was achieved with the use of open-ended interview questions and active listening to gain a true reflection of the participants perspectives. To ensure accurate representation of the participants' experiences, each participant assisted with member checking by reviewing their transcripts and a brief summary of the findings. Peer debriefing occurred throughout the research with my academic advisor and committee members. Due to the subjective nature of this inquiry, I utilized bracketing and reflexivity to openly acknowledge the influence my experience, assumptions, and biases would have toward the findings.

This research has provided non-radiology nurses the opportunity to express, in their own words, their experiences caring for hospitalized IR patients. As a result we now have a better understanding of what they learn about caring for IR patients in their pre-service and in-service programs; what they feel they need to know to provide safe care; and what they have experienced when providing care to IR patients. This new information can be brought forward to influence nursing curriculum, develop in-hospital education programs, and improve interdepartmental collaboration so non-radiology nurses are better prepared to confidently provide safe, holistic care to their IR patients. The findings from this study will be disseminated through peer-reviewed nursing journal publications and with the development of education proposals to transfer IR knowledge to community agencies, nursing education centres and professional nursing organizations.

IR in Canada is somewhat of an invisible specialty nursing practice. Non-radiology nurses clearly described their needs for IR specialty education. Providing them with this knowledge could potentially decrease patient complications, reduce hospital length of stay, emergency room visits and hospital readmissions. IR is a specialty that will keep growing strong with the development and application of advanced technology and the continued recognition of the value of minimally invasive procedures. "What will the future hold? A specialty that not simply survives but that thrives in the next half century" (Kwan, Talenfeld & Brunner, 2016, p. 735).

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Athabasca University
RESEARCH CENTRE

Appendix A: Athabasca University Research Ethics Approval

CERTIFICATION OF ETHICAL APPROVAL

The Athabasca University Research Ethics Board (AUREB) has reviewed and approved the research project noted below. The AUREB is constituted and operates in accordance with the current version of the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans (TCPS) and Athabasca University Policy and Procedures.

Ethics File No.: **23391**

Principal Investigator:
Mrs. Andra Carley,
Faculty of Health Disciplines\Master of Nursing

Supervisor:
Dr. Sherri Melrose (Supervisor)

Project Title:
Non-Radiology Nurses' Experience with Interventional Radiology

Effective Date: March 19, 2019 **Expiry Date**: March 18, 2020

Restrictions:

Any modification or amendment to the approved research must be submitted to the AUREB for approval.

Ethical approval is valid *for a period of one year*. An annual request for renewal must be submitted and approved by the above expiry date if a project is ongoing beyond one year.

A Project Completion (Final) Report must be submitted when the research is complete *(i.e. all participant contact and data collection is concluded, no follow-up with participants is anticipated and findings have been made available/provided to participants (if applicable))* or the research is terminated.

Approved by: **Date:** March 19, 2019

Donna Clare, Chair
Faculty of Health Disciplines, Departmental Ethics Review Committee

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Athabasca University Research Ethics Board
University Research Services, Research Centre
1 University Drive, Athabasca AB Canada T9S 3A3
E-mail rebsec@athabascau.ca
Telephone: 780.675.6718

Athabasca University
RESEARCH CENTRE

CERTIFICATION OF ETHICAL APPROVAL - RENEWAL

The Athabasca University Research Ethics Board (REB) has reviewed and approved the research project noted below. The REB is constituted and operates in accordance with the current version of the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans (TCPS2) and Athabasca University Policy and Procedures.

Ethics File No.: **23391**

Principal Investigator:
Mrs. Andra Carley,
Faculty of Health Disciplines\Master of Nursing

Supervisor:
Dr. Sherri Melrose (Supervisor)

Project Title:
Non-Radiology Nurses' Experience with Interventional Radiology

Effective Date: March 19, 2020 **Expiry Date**: March 18, 2021

Restrictions:

Any modification or amendment to the approved research must be submitted to the AUREB for approval.

Ethical approval is valid *for a period of one year*. An annual request for renewal must be submitted and approved by the above expiry date if a project is ongoing beyond one year.

A Project Completion (Final) Report must be submitted when the research is complete *(i.e. all participant contact and data collection is concluded, no follow-up with participants is anticipated and findings have been made available/provided to participants (if applicable))* or the research is terminated.

Approved by: **Date: February 25, 2020**

Carolyn Greene, Chair
Athabasca University Research Ethics Board

Athabasca University Research Ethics Board
University Research Services, Research Centre
1 University Drive, Athabasca AB Canada T9S 3A3
E-mail rebsec@athabascau.ca
Telephone: 780.675.6718

Appendix B: Peterborough Regional Health Centre Ethics Approval

PRHC
Peterborough Regional Health Centre

April 23, 2019
Andra Carley, RN
Peterborough Regional Health Centre

Re: Non-radiology Nurses' Experiences with Interventional Radiology

Dear Andra,

Your application dated March 25, 2019, regarding the above-mentioned study was reviewed approved by the Research Ethics Board (REB) at a meeting on April 18th, 2019. However, we do recommend that you add the following to the consent form. "By signing this form, I do not waive any of my legal rights."

Approval is granted for a period of one year and may be renewed by request and submission of an annual report.

Sincerely,

Lionel Rubinoff, PhD
Chair, Research Ethics Board
Tel: (705) 743-2121 x 2382
Fax: (705) 876-5095
lrubinof@prhc.on.ca or rubinoff@nexicom.net

The PRHC REB operates according to the requirements of the Tri-Council Policy Statement, 2nd ed. Revised; the Ontario Personal Health Information Privacy Act, the Doctrine of Helsinki, and International Council for Harmonization Good Clinical Practices Guidelines.

Guided by you · Doing it right · Depend on us
www.prhc.on.ca

Peterborough Regional Health Centre
1 Hospital Drive
Peterborough, ON K9J 7C6
705-743-2121

Appendix C: Recruitment Poster

PARTICIPANTS NEEDED for RESEARCH

IN NURSING and INTERVENTIONAL RADIOLOGY

Volunteers are needed to take part in a study that will explore the experiences non-radiology nurses have with interventional radiology patients.

If you are an **RN** or **RPN** who is employed at PRHC anywhere other than the Diagnostic Imaging department; and has cared for at least one patient who has had a procedure in interventional radiology please consider participating in this study.

As a participant in this study, you would be asked to participate in a face-to-face interview with the primary investigator of this research project at a time that is convenient for you.

Your participation would be greatly appreciated. It will help us to understand the experiences, perceptions and knowledge you have about interventional radiology; and to determine the needs to develop undergraduate nursing curriculum units, orientation manuals and other educational tools.

Your participation is entirely voluntary and would take approximately one hour of your time. You will receive a $20 gift certificate for Indigo Chapters in appreciation for your time.

To learn more about this study, or to participate in this study, please contact:

Andra Carley RN, BScN, CRN

705 760 6947

acarley1@athabasca.edu

This study is supervised by:

Dr. Sherri Melrose

sherrim@athabascau.ca

This study has been reviewed by the Athabasca University Research Ethics Board and the Peterborough Regional Health Centre Research Ethics Board.

Appendix D: Letter of Information and Informed Consent

Project Title: Non-Radiology Nurses Experiences with Interventional Radiology

Research Institution: Athabasca University

Researcher:

Andra Carley

Ph. (705) 760-6947

Email: acarley1@athabasca.edu

Supervisors:

Dr. Sherri Melrose

Email: sherrim@athabascau.ca

You are invited to take part in a research project entitled *Non-radiology nurses' experiences with interventional radiology.* This form is part of the process of informed consent. The information presented should give you the basic idea of what this research is about and what your participation will involve, should you choose to participate. It also describes your right to withdraw from the project. In order to decide whether you wish to participate in this research project, you should understand enough about its risks, benefits and what it requires of you to be able to make an informed decision. This is the informed consent process. Take time to read this carefully as it is important that you understand the information given to you. Please contact the principal investigator, Andra Carley if you have any questions about the project or would like more information before you consent to participate.

It is entirely up to you whether you take part in this research. If you choose not to take part, or if you decide to withdraw from the research once it has started, there will be no negative consequences for you now, or in the future.

Introduction

My name is Andra Carley and I am a Master of Nursing student at Athabasca University. As a requirement to complete my degree, I am conducting a research project about the experiences nurses who do not work in radiology have caring for patients who are having or have had interventional radiology procedures. I am conducting this project under the supervision of Dr. Sherri Melrose.

Why are you being asked to take part in this research project?

You are being invited to participate in this project because you are an RN or RPN working at the Peterborough Regional Health Centre outside the diagnostic imaging department who has cared for a patient(s) that has had an interventional radiology procedure.

What is the purpose of this research project?

The purpose of this research is to gain a thorough understanding of the experience's non-radiology nurses have caring for patients who have had an interventional radiology procedure. This research hopes to determine if there is a need to develop an education forum within the local undergraduate nursing curriculum and an orientation program for nurses working in the Peterborough Regional Health Centre.

What will you be asked to do?

If you choose to participate in this study, a one to one and a half-hour, face-to-face interview that will be audio recorded will be scheduled between July 1, 2019 and Oct. 1, 2019 at a time and place that is convenient to your schedule.

A second brief meeting will be scheduled once the interview has been transcribed word for word, for you to review the information to ensure the information you provided is accurate.

What are the risks and benefits?

Participation in this research does not pose any risks to you. Benefits include improving the future education of nurses to improve patient outcomes. You will receive a $20 gift card for Indigo following the interview as a thank you for your participation.

Do you have to take part in this project?

As stated earlier in this letter, involvement in this project is entirely voluntary. You can stop participating at any time during the research study. If you choose to withdraw from the study before the interview is completed, you will not be awarded the $20 gift certificate from Indigo and all data will be confidentially disposed of. If you decide to withdraw after the data has been transcribed and verified for accuracy you will receive the $20 gift card from Indigo, but data cannot be removed because the data is anonymous.

How will your privacy and confidentiality be protected?

The ethical duty of confidentiality includes safeguarding participants' identities, personal information, and data from unauthorized access, use or disclosure.

Your privacy and confidentiality will always be maintained during this study. All participants will be anonymous. Hard data, such as audio recordings, will be kept secured and all transcripts will be password protected. A confidentiality pledge will be signed by the transcriptionist.

How will my anonymity be protected?

Anonymity refers to protecting participants' identifying characteristics, such as name or description of physical appearance.

Data codes will be used instead of participant names. There will be no personal identifiers such as personal descriptions or demographic information included in this study. Direct quotes will be included in the study with your explicit permission and without identifiers to reduce researcher bias. Every reasonable effort will be made to ensure your anonymity; you will not be identified in publications without your explicit permission.

How will the data collected be stored and protected?

Hard copy audio recordings will be stored in a secured, locked filing cabinet. The primary investigator will be the only person to hold the key for access.

All transcribed interviews will be encrypted, and password protected. All files will be properly destroyed within five years after completion of the Master of Nursing thesis.

Data codes will be used in lieu of participants' names to protect the privacy of participants. There will be no personal identifiers such as personal descriptions or demographic information included in this study.

The principle investigator will have the only access to the data. The data will be shared with her supervisor, Dr. Sherri Melrose. The final report will be available to the Athabasca University and the Peterborough Regional Health Centre.

Who will receive the results of the research project?

There is no anticipated future secondary use of the data. Publication of findings from the final thesis in at least two peer-reviewed professional journals will be pursued. The existence of the research will be listed in an abstract posted online at the Athabasca University Library's Digital Thesis and Project Room Upon request, participants will be sent an electronic version of the final thesis.

Who can you contact for more information or to indicate your interest in participating in the research project?

Thank you for considering this invitation. If you have any questions or would like more information, please contact me, (the principal investigator) by e-mail acarley1@athabasca.edu or by phone at 705-760-6947 or my supervisor sherrim@athabascau.ca. If you are ready to participate in this project, please proceed to review the following consent.

Thank you.

Andra Carley

This project has been reviewed by the Athabasca University Research Ethics Board. Should you have any comments or concerns regarding your treatment as a participant in this project, please contact the Research Ethics Office by e-mail at rebsec@athabascau.ca or by telephone at 1-800-788-9041, ext. 6718.

This project has been reviewed by the Peterborough Regional Health Centre Research Ethics Board.

Informed Consent

Your signature on this form means that:

You have read the information about the research project.

You have been able to ask questions about this project.

You are satisfied with the answers to any questions you may have had.

You understand what the research project is about and what you will be asked to do.

You understand that you are free to withdraw your participation in the research project without having to give a reason, and that doing so will not affect you now, or in the future.

You understand that if you choose to end your participation during data collection, any data collected from you up to that point will be destroyed.

You understand that your data is being collected anonymously, and therefore cannot be removed once the data collection has ended.

	YES	NO
I agree to be audio-recorded		
I agree to the use of direct quotations		
I allow data collected from me to be archived on an encrypted and password protected USB stick entitled Master of Nursing thesis that will be secured with lock and key for five-years post completion.		
I am willing to be contacted following the interview to verify that my comments are accurately reflected in the transcript.		

Your signature confirms:

You have read what this research project is about and understood the risks and benefits. You have had time to think about participating in the project and had the opportunity to ask questions and have those questions answered to your satisfaction.

You understand that participating in the project is entirely voluntary and that you may end your participation at any time without any penalty or negative consequences.

You have been given a copy of this Informed Consent form for your records; and

You agree to participate in this research project.

_____ _____

Signature of Participant Date

By signing this form, I do not waive any of my legal rights.

Principal Investigator's Signature:

I have explained this project to the best of my ability. I invited questions and responded to any that were asked. I believe that the participant fully understands what is involved in participating in the research project, any potential risks and that he or she has freely chosen to participate.

_____ _____

Signature of Principal Investigator Date

Appendix E: Semi-Structured Interview Guide

Audio Recorded

Research Question: What are non-radiology nurses' experiences with IR patients?

Interview Questions:

- Tell me about your experience providing care to IR patients?
- Can you describe the situation in which you cared for an IR patient?
- Can you tell me more about…?
- Can you describe a little more?
- Can you tell me what and where you learned about IR?
- From your experience(s), what do you need to know about IR to provide safe patient care?
- If you could change anything what would that be?
- Can you think of anything else you would like to add?

Interview guide. Adapted from "Office of faculty excellence presentation: Formulating in-depth interview questions", by S. Knight, 2013. ECU College of Health and Human Performance, Department of Health Education and Promotion. Retrieved from http://core.ecu.edu/ofe/statisticsresearch/KNIGHT%20Preparing%20Interview%20Guide.pdf

Appendix F: Budget

Budget for Research Project Non-Radiology Nurses' Experiences with Interventional Radiology	
Item	Cost
Chapters Indigo gift cards 10 x $20	$200
15 Recruitment posters (laminated 11x17)	$79.36
Miscellaneous office supplies (printer ink, paper, colored recipe cards)	$50
Total Costs	**$329.36**
Funding Award	
Dorothy Budnek Memorial Scholarship	$800
Total Funding	$800
Balance To be used to cover the costs associated with the dissemination of results, for example. travel, poster presentations etc.	**$470.64**