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child-bearing potential not using appropriate contraceptive measures; patients with hereditary problems of galactose intolerance, glucose-galactose malabsorption, or the Lapp lactase deficiency;

- Warnings and precautions: stable coronary artery disease; high resting heart rate in spite of background beta-blocker regimen; concomitant use of a CYP3A4 inducer or inhibitor; accurate measure of the patient's resting heart rate prior to treatment initiation or dose modification; aortic stenosis; cardiac arrhythmias; atrial fibrillation; sinus node dysfunction; use in patients with intraventricular conduction defects, ventricular dyssynchrony, and third-degree AV-block; low heart rate (< 50 bpm); use of cardiac devices; patients at risk of QT interval prolongation; chronic heart failure; stroke; hypotension; hypertensive patients requiring blood pressure treatment modifications; ophthalmologic, including visual disturbances and effects on ability to drive and use machines; hepatic impairment; renal impairment; sensitivity to lactose; use in women of child-bearing potential, as well as pregnant and nursing women.
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The Product Monograph is also available by calling us at 1-800-363-6093.

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bpm: beats per minute; CV: cardiovascular; HF: heart failure; HR: hazard ratio; CI: confidence interval; BID: twice a day

*Subgroup analysis of the SHIFT study, which was a phase III, randomized, double-blind, placebo-controlled study in 6505 patients with chronic HF. Patients were randomly allocated to receive placebo or LANCORA™ (starting dose: 5 mg BID, titrated up to 7.5 mg BID or down to 2.5 mg BID dependent on heart rate). The sub-study explored outcomes in patients with median baseline heart rate values of 77 bpm ($n=3357$), with a median follow-up of 22.5 months. The primary endpoint was a composite of CV death and hospital admission for worsening HF.



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Contraindications:

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- Resting heart rate < 70 bpm prior to treatment
- Unstable or acute heart failure
- Patients with existing prolonged QT interval (e.g. congenital long QT syndrome)
- Cardiogenic shock
- Acute myocardial infarction
- Severe hypotension (< 90/50 mmHg)
- Severe hepatic impairment
- Sick sinus syndrome
- Sino-atrial block
- Third-degree atrioventricular block
- Pacemaker dependence (heart rate imposed exclusively by the pacemaker)
- Concomitant use with strong CYP3A4 inhibitors
- Concomitant use of verapamil or diltiazem which are moderate CYP3A4 inhibitors with heart-rate-reducing properties
- Pregnancy, lactation, and women of child-bearing potential not using appropriate contraceptive measures
- Patients with hereditary problems of galactose intolerance, glucose-galactose malabsorption, or the Lapp lactase deficiency as LANCORA™ contains lactose.

Relevant warnings and precautions:

- Not indicated for the treatment of patients with stable coronary artery disease because clinical trials failed to show clinical outcome benefit in these patients.
- The treating physician should make every effort to achieve the guideline-recommended target doses of the beta blockers prior to initiating treatment with LANCORA™. If the resting heart rate remains high (i.e. ≥ 77 bpm), then treatment with LANCORA™ may be considered.
- Concomitant use with a CYP3A4 inducer may decrease LANCORA™ exposure, therefore, in case of interruption of treatment with the CYP3A4 inducer, close heart rate monitoring is recommended.
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- Use of LANCORA™ in patients with second degree atrioventricular block has not been studied. Therefore, use of LANCORA™ in these patients should be avoided.
- In patients treated with LANCORA™ the risk of atrial fibrillation is increased. Discontinue treatment with LANCORA™ if atrial fibrillation occurs.
- Concomitant use of LANCORA™ and amiodarone should be avoided. If the combination is deemed necessary, close cardiac monitoring is required.

- Discontinue treatment with LANCORA™ if sinus node dysfunction occurs.
- Patients with intraventricular conduction defects (bundle branch block left, bundle branch block right) and ventricular dyssynchrony should be closely monitored. Discontinue treatment with LANCORA™ if third-degree AV block occurs.
- If during treatment the resting heart rate drops below 50 beats per minute or the patient experiences symptoms related to bradycardia (e.g. dizziness, fatigue or hypotension), the dose must be titrated downward or treatment must be discontinued.
- Concomitant use of LANCORA™ with other heart-rate-lowering drugs may cause excessive bradycardia due to additive effect. Heart rate monitoring is recommended.
- Caution should be exercised and close cardiac monitoring is recommended in patients with hypokalemia.
- Use in patients at risk of QT interval prolongation should be avoided. If concomitant use with QT-prolonging therapies is deemed necessary, close 12-lead ECG monitoring is required. The dose may need to be decreased or stopped depending on the ECG results. Discontinue LANCORA™ if severe cardiac arrhythmias develop.
- Caution and close cardiac monitoring is recommended in patients with cardiac devices.
- Heart failure must be stable before considering treatment with LANCORA™
- Caution in patients with hypotension.
- In hypertensive patients, regular monitoring of blood pressure and reassessment of anti-hypertensive treatments are recommended.
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- Caution when using LANCORA™ in patients with moderate hepatic impairment.
- Caution in patients with severe renal impairment (creatinine clearance < 15 ml/min).

For more information:

Please consult the Product Monograph at <http://webprod5.hc-sc.gc.ca/dpd-bdpp/index-eng.jsp> for more information relating to adverse reactions, drug interactions and dosing information that have not been discussed here. The Product Monograph is also available by calling us at 1-800-363-6093.

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Meet your CCCN Board of Directors

Paula Gaynes, RN, BN – Treasurer



I have been an active member of CCCN since 2009. During the years 2011–2014, I was provincial director for the New Brunswick/Prince Edward Island region. Under my direction and with the support of the Saint John chapter, CCCN became a more visible, active presence in the community.

Currently I am the National Treasurer for the CCCN, participating in budget meetings, planning and preparing for conference and all jobs in-between.

On completing my nursing studies, I found myself working in a cardiac setting in Corpus Christie, Texas. Quite by accident I found my nursing purpose—I did not purposely choose cardiovascular nursing, it rather chose me! Now, 21 years later, I am just as thrilled to be a cardiovascular nurse as I was on my very first shift. I consider myself to be a true advocate and supporter of the cardiovascular nursing specialty.

Lisa Keeping-Burke, BN – Director of Research



I have been in the position of National Research Director at CCCN since 2013. In this role, I have forged many relationships across Canada and have made many lifelong friends along the way. I currently work as an Associate Professor in the Department of Nursing & Health Sciences at the University of New Brunswick in Saint John, NB, and recently was appointed an Associate Dean of Health Research for a five-year term.

I graduated from Memorial University of Newfoundland with a Bachelor of Nursing in 1987 and a Master of Nursing in 1997, and from McGill University with a PhD in Nursing in 2010. Throughout my 30-year career I have worked in five Canadian provinces and across a wide variety of health and educational settings. In my program of research, I use qualitative, quantitative and systematic review methodologies to explore chronic disease management for patients and families, with the focus of my PhD research investigating the effectiveness of a telehealth intervention on recovery in coronary artery bypass graft surgery patients and their caregivers.

Susan Morris – President



My dad always said, “If you have pride and courage you have the ability to be anything you would like.” I feel pride and courage are attributes found in exceptional nurses and I strive for exceptional! I have been a critical care nurse for over 33 years. I graduated from the Saint John School of Nursing in 1984

with a diploma in nursing and I began working in the coronary care unit of the Saint John Regional Hospital in New Brunswick. It was in the CCU that I had the opportunity to administer the first dose of thrombolytics in the province, Streptokinase for those of you old enough to remember!! My love of cardiac nursing took me to the surgical ICU where the newly opened New Brunswick Heart Centre performed its first heart surgery in 1990. I had the honour and privilege to care for the first cardiac surgery patient in New Brunswick along with the notorious Dr. James Parrott, surgeon extraordinaire. I will never forget that day, April 2, 1990, as the patient came into the ICU and I was so excited—I knew that I had cardiac nursing in my heart and soul, surgery in particular. As doctor Parrot left the ICU he said to me “Ms. Morris I have done my job, now the patient is in your hands.” I took that challenge very seriously. For the next 20 years, I advanced my education and obtained a certificate in critical care in 2002, a baccalaureate degree in nursing in 2004, a diploma in university teaching in 2006 and a master’s degree in adult education in 2010. In 2000, I wrote the CNA certification exam in Critical Care and in 2006 I wrote the CNA certification exam in Cardiovascular Care. This served to significantly enhance my “pride in profession.”

My career has progressed from frontline critical care nurse to charge nurse, resource nurse, acting nurse manager and currently I am employed as the lone clinical nurse educator at the New Brunswick Heart Centre. I am a BLS and ACLS instructor and instructor trainer in addition to teaching the provincial critical care course through the University of New Brunswick. I am also employed as the critical care teaching and learning consultant for the University of New Brunswick. I have been on the board of directors for the Canadian Council Cardiovascular Nurses since 2005 and currently serve as the president. The theme of my presidency is courage, for I feel strongly that nurses are the most courageous group of professionals there is. My teaching philosophy is “everyone can learn; but not on the same day, or in the same way”.

Paula Price, PhD, RN – Director of Publications



I am currently the Director of Publications for CCCN. I am the Interim Director of the School of Nursing and Midwifery, at Mount Royal University, Calgary, Alberta. I have been teaching in the Advanced Studies in Critical Care Nursing program for the past 28 years. I have been the Editor for *The Canadian Journal of Cardiovascular Nursing* for about 9 years. I am also the Editor of the *Canadian Journal of Critical Care Nursing*. My MN and PhD are both in cardiovascular critical care nursing. My area of research has been in the area of effects of nursing interventions on cardiac patients. I have been a member of CCCN since the 1980s.

Clare Puzey, RN, BN– Director of Professional Education



I am an advanced practice nurse from Calgary, Alberta, with more than 25 years of experience in the critical care environment including cardiac ICU/CVICU/trauma ICU/pediatrics/emergency and as a flight nurse with STARS Air Ambulance. I am currently the Clinical Nurse Educator for the Cardiac Catheterization Lab/Short Stay Cardiology Unit at the Foothills Medical Centre and am actively involved with provincial STEMI and ACS initiatives. I continue to work shifts in the busy emergency department at the Foothills Medical Centre when able. I feel that my other forte is teaching and advocating for all members of the healthcare team. I try to share any knowledge and expertise I have gained at numerous workshops, simulations, and courses including local and national conferences, Basic and Advanced ECG

lectures, Advanced Cardiac Life Support (ACLS), Trauma Nursing Core Courses (TNCC), and the Adult Critical Care Nursing Program (ACCN). I recently developed a platform for all cardiac educators across Canada to network; share knowledge; and pool resources and best practice guidelines. In Spring of 2017, I assumed the role of Director of Professional Development for the CCCN National Board. This portfolio is instrumental in ensuring all cardiac nurses have the tools; knowledge; practice guidelines and standards necessary to work throughout the cardiac health environment.

Other current CCCN directors include:

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Susan Morris, RN, BN, MEd, CNCC(C), CCN(C)
President, Canadian Council of Cardiovascular Nurses

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Manitoba	33	New Brunswick.....	63
Newfoundland & Labrador	22	Nova Scotia.....	59
Northwest Territories.....	0	Ontario	282
Prince Edward Island	5	Quebec.....	55
Saskatchewan.....	28	Yukon/Nunavut	0

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FALL 2017

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Exam window	➤ November 1 – 15
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SPRING 2018

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Susan Morris, inf. aut., B. Sc. inf., M. Éd., CSI(C), CSIC(C)
Présidente, Conseil canadien des infirmières et infirmiers
en soins cardiovasculaires

Saviez-vous que plus de 750 infirmières et infirmiers en soins cardiovasculaires de tout le Canada sont maintenant titulaires de la désignation nationale CSIC(C)?

Alberta.....	81	Colombie-Britannique	128
Manitoba	33	Nouveau-Brunswick	63
Terre-Neuve-et-Labrador	22	Nouvelle-Écosse	59
Territoires du Nord-Ouest	0	Ontario	282
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- Elle permet de recruter et de maintenir en poste les meilleurs infirmiers ou infirmières.
- Elle favorise des soins sûrs et de grande qualité, en plus de rehausser la culture en matière d'éducation.

DATES IMPORTANTES

AUTOMNE 2017

Période d'inscription à l'examen ou de renouvellement par examen	➤ Du 1 ^{er} juin au 15 septembre
Période d'examen de certification	➤ Du 1 ^{er} au 15 novembre
Dateline de renouvellement par apprentissage continu	➤ Le 30 novembre

PRINTEMPS 2018

Période d'inscription à l'examen ou de renouvellement par examen	➤ Du 10 janvier au 1 ^{er} mars
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Nota : Dès l'obtention de la certification, votre désignation CSIC(C) est valide pour une période de cinq ans.

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Do You Know... How Nitroglycerine Became a Treatment for People with Coronary Artery Disease?

History

Is not nitroglycerine (NG) an explosive? How did it get from there to being a treatment for people with coronary artery disease (CAD)? In this report, I present a brief history of the discovery and development of nitroglycerine as a pharmacologic treatment for people with CAD. A more fulsome report was published by Marsh and Marsh (2000).

Following the work of chemist Pelouze in Paris, Sobrero discovered nitroglycerine in 1847 (Marsh & Marsh, 2000). Sobrero put a small amount of this substance on his tongue, for unknown reasons, but when he did, he developed a “violent headache”. He named this substance pyroglycerine and recognized that it also had explosive properties. In fact, Sobrero suffered facial scarring when some of this substance exploded near him. This discovery was later advanced by Hering in 1849 who tested NG (also called amyl nitrite) in healthy volunteers and observed again that the headache occurred with such “precision” that he started using NG in people with headaches, believing that a substance that produces a certain response will treat that same symptom if given (known as “like cures like” or if something causes a headache it will also take a headache away). Hering renamed nitroglycerine glonoine as an acronym of glycerol trinitrate (GTN) (Hering, 1849).

In 1851, a scientist named Nobel (of the Nobel prize) joined Pelouze and he began manufacturing NG in Sweden and used it to treat patients with headaches. It wasn't until 1867 that Brunton used the compound in Scotland to relieve angina and he noted the resistance to repeated doses (later called nitrite tolerance). Brunton also wrote that nitrites produce vasodilation due to the direct action on the vessel walls (Brunton, 1871). In 1878, Murrell used NG for angina and NG was established as a standard treatment for the relief of anginal pain at the end of the 19th century (Murrell, 1879). The mechanism of action, however, was not discovered until later.

In 1903 Franck (Fye, 1986) suggested amyl nitrite was a coronary vasodilator, but the first truly quantitative measurements of nitrite effects on coronary flow were made by Bodo in the 1920s. In the 1970s, Murad and associates looked into the action of several vasodilators including NG and how they affected guanylate cyclase activity. They showed that soluble guanylate cyclase from smooth muscle was stimulated by the nitrate-containing compounds,

causing an increase in cGMP, which resulted in vascular relaxation. They suggested that the cGMP activation occurred through the formation of nitric oxide (NO) because the gas also increased guanylate cyclase activity (Katsuki, Arnold, Mittal, & Murad, 1977).

Working separately from Murad, Furchgott and Zawadzki discovered that soluble guanylate cyclase could be activated by free radicals, including NO and also that nitrite-containing vasodilators may operate through the release or generation of NO acting on vascular smooth muscle. They named the relaxing substance endothelial-derived relaxing factor (EDRF) (Cherry, Furchgott, Zawadzki, & Jothianandan, 1982). The link to NO was not immediately known, but eventually this led Ignarro and associates to identify EDRF as NO (Ignarro, 1989).

The formation, role and mechanism of action of NO has been extensively reviewed (Berdeaux, 1993; Calver, Collier & Vallance, 1993; Jaffrey & Snyder, 1995; Moncada, Palmer, & Higgs, 1991). We know that physiological NO is produced by the conversion of L-arginine to L-citrulline by the enzyme NO synthase (NOS). NO release activates guanylate cyclase, leading to vasodilation. The principal determinant of NO release is blood velocity (shear stress) and so changes in blood flow and pressure impinge on NO release, which modifies vascular resistance, returning blood flow to normal (Rubanyi, Romero, & Vanhoutte, 1986). NO is rapidly converted to nitrate and nitrite in the blood within 10 seconds of formation.

Summary

Nitroglycerine is a medication that is metabolized after administration and must first be denitrated to produce the active metabolite NO. Nitroglycerine was discovered in 1847 and tasting or close handling can cause intense headaches, which indicates a vasodilation effect. Following Brunton's discovery that amyl nitrite could be used to treat chest pain, Murrell experimented with the use of nitroglycerin to alleviate angina and reduce blood pressure. The substance was adopted into widespread use after he published his results in 1879. ♥

Submitted by
P. Price RN, PhD
Director of Publications
CCCN

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Cardiac Nurses' Knowledge of Palliative Care

Karen Schnell-Hoehn, RN, MN, CCN(C), Estrellita Estrella-Holder, RN, MSc A, MN, CCN(C), CHFN, Lorraine Avery, RN, PhD, CNCC(C)

Abstract

Background: Advances in cardiac treatment options lead to more people living with end-stage cardiovascular disease in need of complex care management requiring escalation of therapies. However, as a person's disease progresses and functional level declines, aggressive treatment options become limited. The risk of treatment out-weighs the benefits, leading to goals of care focused on optimizing quality of life and palliation, thus creating a need for cardiac nurses to be knowledgeable about palliative care.

Objective: The study purpose was to explore the palliative care knowledge of cardiac nurses using the Palliative Care Quiz for Nursing (PCQN).

Methods: The researchers used a descriptive survey design with a convenience sample of 76 nurses from a cardiac unit.

Results: The PCQN mean score was 15 out of a possible 20 points (74.9%). Misconceptions existed related to the palliative care philosophy, pharmacology and the connection of burnout to palliative care.

Conclusion: Palliative care knowledge gaps exist within the cardiac nursing cohort.

Key words: palliative care, nurses' knowledge, cardiac patients

Schnell-Hoehn, K., Estrella-Holder, E., & Avery, L. (2017). Cardiac Nurses' Knowledge of Palliative Care. *Canadian Journal of Cardiovascular Nursing*, 27(4), 9–15.

Background

Cardiovascular disease is among one of the most common reasons for hospitalization and remains the leading cause of morbidity and mortality in North America (Howlett et al., 2010). Advances in the management have contributed to people with cardiac disease living longer. As a person's cardiac disease progresses, the standard treatments may no longer be effective in managing symptoms. As such, provision of care moves from a focus on the prevention of disease progression to a focus on optimizing quality of life and palliation. As the population ages, the number of people with end-stage cardiac disease with substantial symptom burden will continue to increase (Abu-Saad Huijter, Abboud, & Dimassi, 2009; Allen et al., 2012).

The World Health Organization (2017) defines palliative care as an approach to care that improves quality of life for a person and their significant others when problems related to a life-threatening illness exist. This approach focuses on the prevention and relief of suffering using early detection, comprehensive assessments and treatment of pain along with other issues (physical, psychosocial, spiritual) that can occur. As such, it is well accepted that palliative care extends beyond terminal cancer, playing a vital role for patients with end-stage heart disease (Allen et al., 2012; Howlett et al., 2010; Low, Pattenden, Candy, Beattie, & Jones, 2011; McKelvie et al., 2011). Nurses, as patient advocates, coordinators and consistent care providers, have a pivotal role in the provision of palliative care (Choi, Lee, Kim, Kim, & Kim, 2012). The literature identifies a lack of palliative care knowledge among care providers as a barrier to the provision of high-quality palliative care (Abu-Saad Huijter et al., 2009; David & Banerjee, 2010; Grudzen et al., 2013; Schulman-Green, Ercolano, Jeon, & Dixon, 2012; Schulman-Green et al., 2011).

Caring for patients with end-stage cardiac disease can be challenging on an acute cardiac in-patient unit where the focus of patient care tends to be on patient recovery. To facilitate nurses providing quality comfort care in this setting, it is essential that the cardiac nursing cohort have a solid knowledge of palliative care. The purpose of this study was to explore the palliative care knowledge of registered nurses working on an in-patient cardiac unit at a Canadian acute care facility, as a means to help guide future staff educational initiatives for this population. With a focus on knowledge, the framework informing this study is derived from the work of Ross, McDonald, and McGuinness (1996) contained in the Palliative Care Quiz for Nurses (PCQN) tool. As indicated by Ross and colleagues, the conceptual framework that the PCQN is based on includes consultation from an advisory committee, discussion with experts in palliative care, and the supporting literature (Ross et al., 1996).

Literature Review

There are several studies exploring nurses' knowledge of palliative care in the literature (Brazil, Brink, Kaasalainen, Kelly, & McAiney, 2012; Choi et al., 2012; Knapp et al., 2011; Kwekkeboom, Vahl, & Eland, 2006; Malhotra, Chan, Zhou, Dalager, & Finkelstein, 2015; Pfister et al., 2013; Raudonis, Kyba, & Kinsey, 2002; Ronaldson, Hayes, Carey, & Aggar, 2008; Wilson, Avalos, & Dowling, 2016). However, there is a paucity of research studies focusing on palliative care knowledge of cardiac nurses (Kim & Hwang, 2014a; Nordgren & Olsson, 2004). The knowledge of registered nurses about palliative care varies across patient populations, countries and clinical settings (Abu-Saad Huijter et al., 2009; Al Qadire, 2014b; Choi et al., 2012); however, knowledge gaps are consistently identified by the researchers, regardless of

the research methodology or instrument used (Kwekkeboom et al., 2006; Malhotra et al., 2015; Pfister et al., 2013; Wilson et al., 2016).

The PCQN is a widely-used measure of palliative care knowledge that provides a knowledge score from 0 (lowest) to 20 (highest) (Ross et al., 1996). Using this instrument, the knowledge scores in the literature range from 8.0 to 13.2 out of a possible score of 20 (Al Qadire, 2014b; Proctor, Grealish, Coates, & Sears, 2000; Wilson et al., 2016).

A North American study assessing pediatric nurses' knowledge of palliative care using the PCQN found one-half of the nurses answered 12 out of the 20 questions correctly (Knapp et al., 2011). Similar findings were identified in a Korean study using the same tool, where nurses working on cancer wards, intensive care and general medical wards had a mean PCQN score of 12.5 out of a possible 20, suggestive of a lower knowledge level (Choi et al., 2012). Analysis of subgroups within this study did identify that nurses working in oncology or palliative care clinical areas had a stronger palliative care knowledge base compared to those working on general or other specialty clinical areas (Choi et al., 2012). Even in clinical areas outside of this, such as long-term care where patients with palliative care needs are seen regularly, the research shows knowledge gaps (Pfister et al., 2013). For instance, in four such long-term care studies where the PCQN was used, the mean PCQN scores ranged from 11.7 to 12.3 out of a possible 20 (Brazil et al., 2012; Raudonis et al., 2002; Ronaldson et al., 2008; Wilson et al., 2016).

There are two published palliative care studies addressing healthcare providers working with the cardiac population. The first study focused on physicians' and nurses' perceptions of their working relationship with each other and on palliative care in a coronary care setting (Nordgren & Olsson, 2004). Although this qualitative study addressed perceptions, not knowledge base, a primary theme identified relates to the obstacle of insufficient palliative care knowledge and education for the provision of quality care with this patient population. The only research to address cardiac nurses' knowledge of palliative care is a Korean study where an assessment of the palliative care knowledge, along with attitudes regarding care of the dying, and preparedness to practise palliative care with heart failure patients were explored (Kim & Hwang, 2014a). Using the PCQN tool, the researchers found a mean PCQN score of 9.6 out of possible 20 with this nursing cohort.

An area frequently identified as being particularly weak with regard to nurses' palliative care knowledge is the philosophy of palliative care (Kim & Hwang, 2014a; Wilson et al., 2016). For example, one of the major philosophical misconceptions about compatibility of palliative care and aggressive treatment initially questioned by Ross and colleagues (1996) was identified as being very prevalent in the nursing cohort (Brazil et al., 2012; Ronaldson et al., 2008; Wilson et al., 2016). Another palliative care philosophical knowledge gap identified in the literature pertained to the notion of burnout among palliative care nurses (Choi et al., 2012; Malhotra et al., 2015).

Methods

Study Design and Sample

The researchers used a descriptive survey design to investigate the palliative care knowledge of registered nurses. Nurses who held either full-time or part-time status working on an in-patient cardiology, coronary care, cardiac surgery or the intensive care cardiac surgery unit at a Canadian tertiary facility were invited to participate. The exclusion criteria were nurses working with a casual status and those nurses who were on a leave of absence from the clinical area.

Instruments

The PCQN developed by Ross and colleagues (1996) was used with permission. This tool has been translated into various languages and used internationally with various cultures and in various healthcare settings (Adriaansen, Achterberg, & Borm, 2005; Al Qadire, 2014a; Choi et al., 2012; Kim & Hwang, 2014a; Knapp et al., 2011; Proctor et al., 2000; Raudonis et al., 2002; Wilson et al., 2016).

The PCQN includes 20 items that focus on the most frequently held misconceptions about palliative care where the participants can answer True, False, or I do not know (Ross et al., 1996). The tool reflects three conceptual categories including philosophy and principles of palliative care (four statements), management and control of pain and symptoms (13 statements), and provision of psychosocial and spiritual care (three statements). All 20 items are discrete; each item is distinct in form or concept. The internal consistency of PCQN has been reported to be 0.78 (Ross et al., 1996). Additional demographic variables collected included age category, highest level of nursing education, years of clinical experience, and current clinical practice area.

Data Collection Procedure

The study was approved by the local University Health Research Ethics Board and the facility's Research Review Committee. Participation in the study was voluntary and there was no compensation for study participants. All registered nurses who met the study criteria were sent a package containing the invitation to participate, which provided an explanation of the research study, the self-administered study questionnaire and an addressed return envelope. Hospital volunteers hand delivered these packages to the clinical area, where they were placed in the registered nurses' work mailbox. Informed consent to participate was inferred by the completion and return of the survey in the provided envelopes. As a means to support anonymity and confidentiality of participants, neither the program leadership nor the study researchers had access to the list of potential participants, the area participants worked in or other personal information. In addition, no names, identifying numbers or codes were on the questionnaires. Study findings were analyzed and reported by cohort of participants.

Data Analysis

Demographic information was entered into the Statistical Package for the Social Sciences (SPSS) to calculate descriptive statistics for the sample. Continuous variables were calculated as means with standard deviations and comparisons were determined using the t-test.

Results

Demographic profile: One hundred and twenty-six registered nurses met the eligibility criteria in this study. Sixty percent (76/126) completed the survey. Descriptive statistics for the sample are found in Table 1. The majority of the respondents were between 30–49 years of age, predominately women (90%), and baccalaureate degree-prepared (60.5%). The majority of respondents had zero to five years of clinical experience.

The PCQN tool: The correct answers were summed together and the final PCQN knowledge score was the number of correct answers divided by the total possible score (i.e., 20) depicted as a percentage for those participants who answered the statement either true or false. The ‘I don’t know’ option Ross and colleagues (1996) included in the PCQN tool distinguishes between not knowing and guessing was not included in the score calculation. The total scores could range from 0 to 20 (0–100%). The higher the total score, the higher the percentage of correct responses, which reflects a higher level of nursing palliative care knowledge. Ross and colleagues did not specify an acceptable level for this total score. However, subsequent

authors describe their PCQN mean score of 11.8/20 (60%) and 8.3/20 (41%) as ‘moderate’ and ‘very low’ respectively (Al Quadire, 2014b; Wilson et al., 2016). The total mean scores for the 20 items were obtained for comparison with previously published studies. The mean score in our study was 74.9% (15/20), SD 13.4 with the lowest score being 35.2% and the highest being 100%. Table 2 identifies the percentage of times the statements were answered correctly or incorrectly/I don’t know.

The results of the PCQN survey were analyzed in the same three categories used by Ross and colleagues (1996): namely, palliative care philosophy, pain and other symptoms and psychosocial and spiritual care (Table 3). The mean scores for the three categories were derived from the sum of the total correct answers for all questions in the category over the sum of correct and incorrect answers for the all questions in the category. The majority of the statements on the PCQN focus on pain and other palliative care symptoms with 13 of the 20 statements addressing this category.

For the pain and other symptom category, 75.2% (641/852) of the participants answered the statements correctly. A significant number of the participants had difficulty in correctly answering statement 14 related to side effects of codeine compared to morphine. Thirty-three percent (25/76) answered this statement correctly and 67% (51/76) either answered this statement incorrectly or indicated “I don’t know.” Also of note, the association of drowsiness, electrolyte imbalance, and reduced need for sedation at end of life in statement 6 was answered incorrectly or “I don’t know” by 63% (48/76) of the participants.

The four statements addressing palliative care philosophy were answered correctly by 68.7% (182/265). Participants had particular difficulty in statement 12. Seventy-five percent (57/76) did not correctly identify palliative care as being compatible with aggressive treatment and answered the statement incorrectly or indicated “I don’t know.” Forty-two percent (32/76) answered the statement incorrectly or indicated ‘I don’t know’ that the accumulation of losses was not automatically associated with burnout for those working in palliative care.

The three statements on the PCQN related to the psychosocial/spiritual category focus on hope, suffering, loss and spirituality. Participants scored the highest on this category compared to the other categories with 82% (159/194) answering these statements correctly.

Correlations

For correlations related to the demographic variables, the only variable to significantly impact on differences between the group means was nurses’ educational level. Nurses who were baccalaureate prepared obtained higher mean scores of the PCQN quiz compared to diploma prepared nurses ($p=0.029$). The mean score obtained on the PCQN survey was 77.8% for baccalaureate nurses versus 70.8% for diploma

Age (years)	20–29	17.1% (13/76)
	30–39	35.5% (27/76)
	40–49	34.2% (26/76)
	50–59	13.2% (10/76)
	60+	0%
Sex	Women	89% (68/76)
	Men	11% (8/76)
Level of Education	Diploma	36.8% (28/76)
	Baccalaureate	60.5% (46/76)
	Master	2.6% (2/76)
Years of Experience	0–5 years	39.5% (30/76)
	6–10 years	15.8% (12/76)
	11–15 years	11.8% (9/76)
	16–20 years	7.9% (6/76)
	21+ years	25% (19/76)

Table 2: Percentage of Correct and Incorrect and/I Don't Know Responses to Statements			
Questions asked	Responses		
	Correct %	Incorrect %	Don't know %
1. Palliative care is only appropriate in situations where there is evidence of a downhill trajectory or deterioration.	68	24	8
2. Morphine is the standard used to compare the analgesic effect of other opioids.	50	33	17
3. The extent of the disease determines the method of pain treatment.	63	33	4
4. Adjuvant therapies are important in managing pain.	95	4	1
5. It is critical for family members to remain at the bedside until death occurs.	82	14	4
6. During the last days of life, drowsiness associated with electrolyte imbalance may decrease the need for sedation.	37	43	20
7. Drug addiction is a major problem when morphine is used on a long-term basis for management of pain.	75	20	5
8. Individuals who are taking opioids should also follow a bowel regime.	97	0	3
9. The provision of palliative care requires emotional detachment.	92	5	3
10. During the terminal stages of an illness, drugs that can cause respiratory depression are appropriate for the treatment of severe dyspnea.	61	26	13
11. Men generally reconcile their grief more quickly than women.	67	4	29
12. The philosophy of palliative care is compatible with that of aggressive treatment.	25	57	18
13. The use of placebos is appropriate in the treatment of some types of pain.	71	7	22
14. In high doses codeine causes more nausea and vomiting than morphine.	33	24	43
15. Suffering and physical pain are synonymous.	78	16	5
16. Demerol is not an effective analgesic for the control of chronic pain.	55	21	24
17. The accumulation of losses renders burnout inevitable for those who work in palliative care.	57	24	19
18. Manifestations of chronic pain are different from those of acute pain.	74	13	13
19. The loss of a distant or contentious relationship is easier to resolve than the loss of one that is close or intimate.	62	29	9
20. Pain threshold is lowered by fatigue or anxiety.	58	36	7

prepared nurses. Nurses with a baccalaureate degree were also younger and had less clinical experience compared to diploma prepared nurses.

Discussion

The mean PCQN score was higher in this study than the scores reported in other similar studies. However, the score range suggests a high degree of variability. This study, to our knowledge, is one of the first to address cardiac nurses' knowledge of palliative care in North America. A notable difference among the published studies and this study relates to participant recruitment. In this study, there were no student nurses in the sample, which differs from some of the previous literature that included both student nurses and

Table 3: PCQN Scores by Categories		
Categories	PCQN Question #	Mean % (n/total)
Pain and Other Symptoms	2-4, 6-8, 10, 13-16, 18, 20	75.2% (641/852)
Palliative Care Philosophy	1, 9, 12, 17	68.7% (182/265)
Psychosocial and Spiritual Care	5, 11, 19	82% (159/194)
Total Score	1-20	74.9% (15/20)

practising nurses (Al Qadire, 2014a; Al Qadire, 2014b; Kim & Hwang, 2014a). Inclusion of students in these studies may have lowered the PCQN scores. Higher mean scores for this study may also be reflective of a program that supports continuing nursing education and research. As well, the organization used in this study had an active palliative care consult service, including 24-hour on-call support that could easily be contacted by the healthcare team. The role of this on-site consult team is to provide expertise to patients with palliative care needs and help support and educate the healthcare teams who care for them.

Nurse participants with higher PCQN scores reported higher nursing education levels. This finding is consistent with previous research where a higher level of palliative care knowledge was associated with a higher nursing educational level (Kim & Hwang, 2014b; Proctor et al., 2000; Ross et al., 1996). A plausible explanation for this finding in our study may be related to the previous divergent nursing curriculum and programs for nursing education. It is hypothesized that shorter nursing programs may not have provided sufficient exposure to palliative care.

Palliative care misconceptions were evident in this study. In the pain and other symptoms management category, only half of the participants were aware that morphine was the standard medication used to compare the analgesic effects of other opioids. As well, there were knowledge gaps in relation to the effects of codeine compared to morphine. This is perhaps explained by the prescribing culture in North America where, anecdotally, codeine products tend to be used as first-line opioid agents for pain associated with non-malignancy, perpetuating the misconception that codeine has fewer side effects compared to morphine. Previous research conducted by Costello and Thompson (2015) addressed nurses' knowledge and attitudes toward opioids. These authors identified that 25% of nurse participants answered more than half of the questions on an opioid survey incorrectly suggesting there are knowledge gaps related to opioid use.

The association of drowsiness, electrolyte imbalance, and reduced need for sedation at end of life was answered incorrectly by 63% of the participants. A knowledge gap related to the impact of dehydration and electrolyte imbalances at the end of life, which act as a natural sedative in the body, was also reported by Proctor and colleagues (2000). This is not surprising, as knowledge around the effects of physiological changes at the end of life on the body are often developed anecdotally, as nurses observe these changes for themselves when caring for dying patients. As such, a knowledge deficit may be especially prevalent with cardiac nurses where there is limited exposure to patients dying naturally without cardiac intervention or life-saving measures.

There were misconceptions in two statements related to the philosophy of care category. Seventy-five percent of the participants either answered incorrectly or did not know

that palliative care is compatible with aggressive treatment. This is consistent with other studies (Brazil et al., 2012; Raudonis et al., 2002; Ronaldson et al., 2008; Wilson et al., 2016). Palliative care is often associated with advanced malignancy and cancer related diseases, which impacts on how health care providers perceive palliative care as a philosophy. Health care providers may falsely believe palliative care is reserved for those at end of life where aggressive therapy is no longer pursued. The unpredictable disease course of end stage cardiac disease can exacerbate this, as often palliative care is introduced during a person's final days (Ghashghaei, Yousefzai, & Adler, 2016). This is concerning, as the benefit of establishing palliative care early is lost and perpetuates the practice of discontinuing therapies traditionally used to prolong life, which may also provide benefit with comfort care. Supporting a practice where disease modifying therapies and palliative treatment may need to run concurrently during the illness is essential to address symptom management and holistic patient needs (Allen et al., 2012; Whellan et al., 2014).

Another misconception in the philosophy of care category is related to 40% of participants mistakenly associated burnout with accumulation of losses in palliative care. Kim and Hwang (2014b) revealed that 91% of those surveyed answered this statement incorrectly. These results may reflect the general misconception also held by nurses that caring for patients who are at the end of their life and being exposed to death and family grieving on a regular basis are sources of stress for nurses. Peters and colleagues (2012) address this public perception in their work on stress and burnout in palliative care nurses, and found there was no strong evidence that nurses in palliative care experience higher stress levels than those in other clinical areas. Rather, these authors identified structure of the workplace (organization demands, inadequate resources, role conflict, conflict with patients and their families) as significant factors influencing burnout. Based on this research, it appears that nurses working with palliative care patients consistently have developed constructive coping strategies to mitigate the effects of stress. It is plausible that cardiac nurse participants projected the stress they experience when faced with caring for a patient at the end of life (which is seen with lower frequency in their clinical practice) onto palliative care nurses who care for this population daily.

The spiritual and psychosocial category of the PCQN quiz was well answered with correct scores ranging from 61.8% to 82.4%. This category addressed hope, suffering, loss and spirituality, which are not unique to palliative care. These concepts of holistic care transcend clinical boundaries of palliative care and are incorporated into nursing practice throughout the various specialists. These findings are also seen in previous studies using the PCQN tool (Ronaldson et al., 2008; Wilson et al., 2016).

Study Limitations

Study limitations, methodological in nature must be acknowledged. First, the cross-sectional design used gave a 'snap-shot' of palliative care knowledge, but excluded the variable of time. Using convenience sampling, participants were largely self-selected. It is possible that individuals who were more motivated and interested in palliative care completed the survey, which may have skewed the PCQN scores and other study results. The study focused on nurses answering questions about their palliative care knowledge, which may not reflect actual practice at the bedside, as participants were not observed in their clinical practice. As well, with a smaller sample size, it is very difficult to generalize the study findings to other cardiac nursing cohorts or practice settings.

Implications for Practice

The authors of this study found palliative care knowledge among registered nurses working on a cardiac unit appears to be higher than previous studies; however, the wide range of scores on the PCQN suggest further education is needed in this area. Developing educational strategies that are built on collaborative relationships between the two specialties (cardiology and palliative care) may reduce these knowledge deficits. Although challenges arise with acute care cardiac nurses maintaining proficiency with providing palliative care, inroads have been made at the research site used in this study. For instance, a working group consisting of clinical practice nurses, advanced practice nurses and physicians from palliative care and cardiology was established and remains active to address care needs and clinical questions for this patient population. The results of this study provide preliminary information on where to focus educational efforts with this nursing cohort. There has been limited research focused on the general effects of educational strategies on palliative care knowledge; published research in this area remains absent for nurses caring for the end-stage cardiac populations. Future research using both qualitative and quantitative research methods is needed to gain a better understanding of palliative care gaps that exist with this population. Achieving clinical improvements requires the

integration of palliative care knowledge into clinical practice at the bedside (Kim & Hwang, 2014a), which was not examined in this study. Research examining the link between knowledge and clinical practice change is needed to build a strong foundation of palliative care for those with end stage cardiac disease.

Conclusion

The concept of integrating palliative care into the management of patients with advanced, end-stage cardiac disease, as a means of better symptom control and quality of life is well accepted (Dalgaard et al., 2014; Howlett et al., 2010; Whitaker, George Kernohan, Hasson, Howard, & McLaughlin, 2006). The gaps in palliative care knowledge among cardiac nurses identified in this research suggests a need for ongoing support of nursing education regarding the philosophy of palliative care along with management of symptoms and the proper use of opioids. This study provides preliminary data to understand the palliative care learning needs of nurses, which organizations can strategically target to improve the quality of palliative care with end-stage cardiac patients. ♥

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