Canadian Journal of Cardiovascular Nursing

Revue canadienne de soins infirmiers cardiovasculaires

VOLUME 31, ISSUE 2 • SUMMER 2021 eISSN: 2368-8068

> Canadian Council of Cardiovascular Nurses



Conseil canadien des infirmières et infirmiers en soins cardiovasculaires

Being part of a group just got better

Faire partie d'un groupe a ses avantages

As a **member** of **CCCN**, you can view and print your insurance documents, add a driver, get a quote and more—online or via The Personal app, 24/7 with our **Online Services.** En tant que **membre** du **CCIISC**, vous pouvez consulter et imprimer vos documents d'assurance, ajouter un conducteur, obtenir une soumission et plus encore – tout cela en ligne ou via l'application La Personnelle 24 h sur 24 grâce à nos **Services en ligne**.



Go online to get a quote today. thepersonal.com/cccn 1-888-476-8737



Conseil canadien des infirmières et infirmiers en soins cardiovasculaires



Obtenez une soumission en ligne dès maintenant. lapersonnelle.com/cciisc 1 888 476-8737

La Personnelle désigne La Personnelle, assurances générales inc. au Québec et La Personnelle, compagnie d'assurances dans les autres provinces et territoires. Certaines conditions, exclusions et limitations peuvent s'appliquer. L'assurance auto n'est pas offerte au Man., en Sask. ni en C.-B., où il existe des régimes d'assurance gouvernementaux.

The Personal refers to The Personal General Insurance Inc. in Quebec and The Personal Insurance Company in all other provinces and territories. Certain conditions, limitations and exclusions may apply. Auto insurance is not available in MB, SK and BC due to government-run plans.

Canadian Journal of Cardiovascular Nursing

Revue canadienne de soins infirmiers cardiovasculaires

eISSN: 2368-8068

VOLUME 31, ISSUE 2, SUMMER 2021

2 Editorial Board

ARTICLES

- **4** Women's Descriptions of Their Experiences of Lifestyle Management after Spontaneous Coronary Artery Dissection *Connie Clark, MSN, RN Sandra Lauck, PhD, RN, Sally Thorne, PhD, RN, FCAHS, FAAN, FCAN, Martha Mackay, PhD, RN, CCN(C)*
- 14 Delirium Pharmacotherapeutics in the Cardiac Intensive Care Unit: An Alphabetical Mnemonic Approach Mohamed El Hussein, RN, PhD, NP, Shani Markus, BN Student
- 20 The Impact of Nurse Practitioners on Health Outcomes in Outpatient Heart Failure Management: A Systematic Review *Payal Fichadiya, ACNP, MN, BSc, Karen L. Then, CCN(C), ACNP, PhD, James A. Rankin, ACNP, PhD*

Canadian Journal of Cardiovascular Nursing

Address

Canadian Council of Cardiovascular Nurses 202–300 March Road Ottawa, Ontario K2K 2E2 Phone: 613-599-9210, Fax: 613-595-1155 Email: david@cccn.ca

For general information, please contact: cccnmail@cccn.ca

Publishing

The Canadian Journal of Cardiovascular Nursing is published three times per year by the Canadian Council of Cardiovascular Nurses (CCCN).

This is a refereed journal concerned with healthcare issues related to cardiovascular health and illness. All manuscripts are reviewed by the editorial board and selected reviewers. Opinions expressed in published articles reflect those of the author(s) and do not necessarily reflect those of the Board of Directors of CCCN or the publisher. The information contained in this journal is believed to be accurate, but is not warranted to be so. The CCCN does not endorse any person or products advertised in this journal. Produced by Pappin Communications, Pembroke, Ontario.

Managing Editor

Layout and Design

Heather Coughlin Pembroke, ON

Sherri Keller Pembroke, ON

Advertising

For information on advertising, please see www.cccn.ca for the rate sheet with full technical specifications.

Yearly subscription rates*

| | Canada | International |
|-----------|---------|---------------|
| ndividual | \$85.00 | |

| Institution | \$100.00 | \$125.00 |
|-------------|----------|----------|
| Institution | \$100.00 | \$125.00 |

If you become a member of CCCN for \$85.00* (CAD) annually, you will receive your journal subscription at no additional charge. * Plus applicable taxes

Subscriptions

Subscribe online at: www.cccn.ca

Or send cheque or money order to: Canadian Council of Cardiovascular Nurses 202–300 March Road Ottawa, Ontario K2K 2E2

Indexing

The Canadian Journal of Cardiovascular Nursing is indexed in EBSCO. eISSN: 2368-8068

Revue canadienne de soins infirmiers cardiovasculaires

Editor

Jo-Ann V. Sawatzky, RN, MN, PhD Senior Scholar College of Nursing, University of Manitoba, Winnipeg, MB

Associate Editors

Davina Banner-Lukaris, RN, PhD Associate Professor, School of Nursing, University of Northern British Columbia (UNBC) Adjunct Professor, Northern Medical Program, UNBC Visiting Scientist, Ottawa Hospital Research Institute Prince George, BC

Tracey J.F. Colella, RN, PhD

Scientist, KITE | Toronto Rehab | University Health Network Cardiovascular Prevention & Rehabilitation Program Associate Professor, Lawrence S. Bloomberg Faculty of Nursing Rehabilitation Science Institute University of Toronto, Toronto, ON

Julie Houle, RN, PhD, CCN(C)

Full professor Nursing Department | Université du Québec à Trois-Rivières (UQTR) Co-director of the Groupe interdisciplinaire de recherche appliquée en santé, UQTR Scientific Director of Medical and Clinical Research, CIUSSS MCQ Trois-Rivières, QC

Krystina B. Lewis, RN, MN, PhD, CCN(C)

Assistant Professor, School of Nursing, Faculty of Health Sciences, University of Ottawa Affiliate Researcher, University of Ottawa Heart Institute, Ottawa, ON

Martha Mackay, RN, PhD, CCN(C)

Clinical Associate Professor/Clinical Nurse Specialist School of Nursing, University of British Columbia/St. Paul's Heart Centre, Vancouver, BC

Karen Schnell-Hoehn, RN, MN, CCN(C)

Clinical Nurse Specialist Palliative Care Program, St. Boniface Hospital, Winnipeg, MB

Connie Schumacher, RN, MSN, PhD Assistant Professor Nursing

Brock University, St. Catharines, ON

Heather Sherrard, BScN, MHA

Clinical Research Associate University of Ottawa Heart Institute Research Corp, Ottawa, ON

Karen L. Then, RN, CCN(C), ACNP, PhD

Professor & Acute Care Nurse Practitioner Faculty of Nursing, University of Calgary, Calgary, AB

> Canadian Council of Cardiovascular Nurses

Conseil canadien des infirmières(iers) en nursing cardiovasculaire

Editorial

Nurses deserve to believe they make a difference, because they do!

— Renee Thompson

In this issue of the Canadian Journal of Cardiovascular Nursing (CJCN), we see evidence of the ways in which nurses really do make a difference! Connie Clark and colleagues provide insights into women's descriptions of their experiences of lifestyle management following a spontaneous coronary artery dissection or SCAD. Dr. Mohamed El Hussein and a colleague provide a unique alphabetic mneumonic approach to facilitate nurses' understanding and recall of pharmacotherapy used in the complex management of delirium in the cardiac ICU. Payal Fichadiya and co-authors share the findings of their systematic review examining the impact of nurse practitioners on health outcomes in outpatient heart failure management. I also draw your attention to several opportunities for you to make a difference in cardiovascular nursing: 1) We are delighted to announce a call for English and French papers for our next CJCN theme issue: *COVID-19's Impact on Cardiovascular Nursing: Lessons Learned.* I invite you and your colleagues to reflect and share your lessons learned as we begin to see the light at the end of the pandemic tunnel! 2) We are also seeking qualified English and French Associate *Editors* and *Guest Peer Reviewers* for the CJCN. I encourage you to consider these opportunities to make a difference in cardiovascular nursing scholarship and publishing. Please see inside this issue for further details.

Happy reading! Jo-Ann V. Sawatzky, RN, PhD Editor, CJCN Often when you think you're at the end of something, you're at the beginning of something else.

— Fred Rogers

The Canadian Journal of Cardiovascular Nursing announces a Call for Papers for a Special Theme Issue: *COVID-19's Impact on Cardiovascular Nursing: Lessons Learned*

As we are beginning to see the end of the COVID-19 pandemic, it is time to reflect and share our lessons learned during this pandemic! What positive changes have occurred in your workplace that will change healthcare for the better going forward? What challenges have you had to overcome? Broad topic areas related to this theme may include, but are not limited to:

- Virtual Care
- Cardiac Rehabilitation
- Patient & Nursing Education
- Impact on the Nursing Workforce
- New & Alternative Models of Care
- Long Haulers & Cardiovascular Health

The Canadian Journal of Cardiovascular Nursing (CJCN) is pleased to announce the call for papers for a special theme issue on COVID-19 in the Summer/Fall, 2022 issue. We invite any and all nurses, including researchers, clinicians, educators, leaders, and others to consider submitting original research, short reports, knowledge synthesis/review papers, commentaries, case reports, arts informed scholarship, and other discourse relevant to this theme.* Please direct queries to Dr. Jo-Ann Sawatzky, CJCN Editor at joanne.sawatzky@umanitoba.ca. Deadline for submissions: March 1, 2022.

*Please follow CJCN Author Guidelines for all submissions: https://www.cccn.ca/media.php?mid=1278

OPPORTUNITY

Associate Editors & Guest Peer Reviewers for the Canadian Journal of Cardiovascular Nursing

We are currently seeking **Associate Editors** and **Guest Peer Reviewers** for the Canadian Journal of Cardiovascular Nursing (CJCN). Required qualifications include:

- At least 5 years of cardiovascular nursing experience
- A current CCCN membership
- A minimum of master's preparation
- Experience in publishing in peer-reviewed journals

We encourage qualified nurses to consider these rewarding roles. Experience reviewing manuscripts is preferred for the Associate Editor role. The Guest Peer Reviewer role is an ideal way to gain experience reviewing manuscripts, with guidance and support from the Editor. Guest peer reviewers should possess subject-matter expertise in the topic of the paper to be reviewed.

This is an opportunity to learn and grow, and to share your knowledge and expertise in the area of cardiovascular nursing scholarship and publishing! For further information on these opportunities to participate in the CJCN publication process, please contact CCCN Director of Communications & CJCN Editor, Dr. Jo-Ann Sawatzky at joanne.sawatzky@umanitoba.ca

Tout ce qui a un début a une fin, mais chaque fin est le début d'un nouveau depart.

— Serge Zeller

La revue canadienne de soins infirmiers cardiovasculaires annonce un appel à communications pour un numéro thématique spécial: L'impact de COVID-19 sur les soins infirmiers cardiovasculaires: Leçons tirées

Alors que nous commençons à voir la fin de la pandémie de COVID-19, il est temps de réfléchir et de partager les leçons que nous avons tirées de cette pandémie. Quels sont les changements positifs survenus sur votre lieu de travail qui vont améliorer les soins de santé à l'avenir? Quels sont les défis que vous avez dû surmonter? Les grands sujets liés à ce thème peuvent inclure (mais ne sont pas limités à):

- Soins virtuels
- Réadaptation cardiaque
- Education des patients et des infirmières
- Impact sur le personnel infirmier
- Modèles de soins nouveaux et alternatifs
- COVID-19 à long terme et santé cardiovasculaire

La revue canadienne de soins infirmiers cardiovasculaires (RCSIC) a le plaisir d'annoncer un appel à communications pour un numéro thématique spécial sur la COVID-19 dans le numéro d'été/automne 2022. Nous invitons toutes les infirmières et tous les infirmiers, y compris les chercheurs, cliniciens, éducateurs, les leaders et autres, à soumettre des recherches originales, des rapports succincts, des synthèses de connaissances, des commentaires, des rapports de cas, des études fondées sur l'art et tout autre discours pertinent à ce thème.* Veuillez adresser vos questions à Dre Jo-Ann Sawatzky, rédactrice en chef, à l'adresse joanne.sawatzky@umanitoba.ca. Date limite pour les soumissions : 1^{er} mars 2022.

*Veuillez suivre les directives de la RCSIC concernant les auteurs pour toutes les soumissions : https://www.cccn.ca/media. php?mid=1278

OPPORTUNITÉ

Rédacteurs adjoints et évaluateurs invités pour la revue canadienne de soins infirmiers cardiovasculaires

Nous sommes actuellement à la recherche de **rédacteurs adjoints** et **d'évaluateurs invités** pour la revue canadienne de soins infirmiers cardiovasculaires. Les qualifications requises pour ces postes sont les suivantes:

- Au moins 5 ans d'expérience en soins infirmiers cardiovasculaires
- Être membre en règle du Conseil canadien des infirmières et infirmiers en soins cardiovasculaires
- Préparation à la maîtrise, au minimum
- Avoir publié dans des revues évaluées par les pairs

Nous encourageons les infirmières et infirmiers qualifiés à envisager ces rôles enrichissants. De l'expérience avec la révision de manuscrits est préférable pour le poste de rédacteur adjoint. Le rôle d'évaluateur invité est un moyen idéal d'acquérir de l'expérience dans la révision de manuscrits, avec les conseils et le soutien de la rédactrice en chef. Les évaluateurs invités doivent posséder une expertise dans le domaine du manuscrit à évaluer.

C'est une occasion d'apprendre et de développer ses compétences professionnelles, et de partager vos connaissances et votre expertise dans le domaine de la recherche et de l'écriture en soins infirmiers cardiovasculaires. Pour obtenir de plus amples renseignements sur ces postes, veuillez communiquer avec la directrice des communications et rédactrice en chef de la RCSIC, Dre Jo-Ann Sawatzky, à l'adresse joanne.sawatzky@umanitoba.ca

Women's Descriptions of Their Experiences of Lifestyle Management after Spontaneous Coronary Artery Dissection

Connie Clark, MSN, RN,^{1*} Sandra Lauck, PhD, RN, ²³ Sally Thorne, PhD, RN, FCAHS, FAAN, FCAN,² Martha Mackay, PhD, RN, CCN(C)²³

¹Vancouver General Hospital, Vancouver, BC

²University of British Columbia School of Nursing, Vancouver, BC

³ St. Paul's Hospital, Vancouver, BC

Corresponding address: Vancouver General Hospital, 855 West 12th Avenue, Vancouver, BC V5Z 1M9; email: connie.clark@alumni.ubc.ca

Abstract

Background. Spontaneous coronary artery dissection (SCAD) is a relatively rare form of acute coronary syndrome (ACS), most commonly experienced by younger women. Therefore, current guidelines for ACS patients often do not apply to women after SCAD.

Purpose. We aimed to explore younger women's descriptions of their recovery from SCAD, focusing on lifestyle management.

Methods. We used interpretive description methodology to explore seven women's experiences three to 18 months after their SCAD event.

Results. We identified an overarching theme of being lost in an unfamiliar diagnosis, with four subthemes: being diagnosed with a rare disease, swirling in an information vacuum, finding support, and adjusting to and resuming a more normal life.

Conclusions. SCAD survivors have unique needs that differ from patients with ACS. Advanced practice cardiovascular nurses may play a key role in providing women with SCAD with more individually tailored care in the early stages of their recovery.

Keywords: spontaneous coronary artery dissection, women, lifestyle management, acute coronary syndrome, nursing

Clark, C., Lauck, S., Thorne, S., & Mackay, M. (2021). Women's Descriptions of Their Experiences of Lifestyle Management after Spontaneous Coronary Artery Dissection. *Canadian Journal of Cardiovascular Nursing*, 31(2), 6–13.

Key Highlights

- Women with SCAD have unique informational and care needs and experience gaps in care in the early recovery period that differs from atherosclerotic ACS.
- This study found that women initially felt lost in their SCAD diagnosis due to a lack of information and support with their diagnosis, and only once they found support could they begin returning to a more normal way of life.
- A team-based approach to care, led by an advanced practice nurse, may be an effective approach to coordinating management and attending to the unique needs of SCAD patients.

Background

Historically, cardiovascular disease (CVD) has been primarily considered "a man's disease" (Hildingh et al., 2007; Rosenfeld & Gilkeson, 2000). Because of this, treatment has conventionally been guided by basic science and clinical trials largely based on men (Humphries et al., 2017). Yet, CVD is the primary cause of death of one third of the world's female population (World Health Organization, 2017), and women remain under-researched, under-diagnosed, and under-treated (The Heart and Stroke Foundation of Canada, 2018). There is growing evidence that women with CVD, as defined by their sex (i.e., biological attributes) and/or gender (i.e., socially constructed roles, behaviours, and identities), have unique features pertaining to prevention, diagnosis, treatment, and outcomes (Almond et al., 2012; Galick et al., 2015; Leifheit-Limson et al., 2015). The gap between men and women in CVD prevalence and the lack of evidence specifically on females continues to negatively impact women's outcomes (Almond et al., 2012; Galick et al., 2015; Leifheit-Limson et al., 2015; The Heart and Stroke Foundation of Canada, 2018). International regulatory, health policy and research organizations have made a call to arms to address this gap for diseases that are relevant to women (Canadian Institue of Health Research, 2019; National Institue of Health, 2017).

Spontaneous coronary artery dissection (SCAD) is a relatively rare, but important non-atherosclerotic form of acute coronary syndrome (ACS) that primarily affects younger women, often in the absence of pre-existing cardiac risk factors (Hayes et al., 2018; Saw et al., 2016). SCAD is an unexpected event that occurs when there is an intimal dissection and/or intramural hematoma formation in a coronary artery, which results in disruption of coronary blood flow (Hayes et al., 2018; Tweet et al., 2015). SCAD is the underlying cause of an estimated 1.7–4% of overall ACS presentations (Rashid et al., 2016), and is responsible for 0.5% of sudden cardiac deaths (Hill & Sheppard, 2010); although some research suggests that SCAD's prevalence could be higher because of misdiagnosis (Hayes et al., 2018). Importantly, fairly recent research suggests that SCAD accounts for 22–35% of ACS presentation in women < 60 years (Nishiguchi et al., 2016; Rashid et al., 2016); 92–95% of all SCAD cases involve women with a mean age of 44 to 55 years at the time of event (Saw et al., 2013; Saw, Aymong, Sedlak et al., 2014).

The aforementioned disadvantages experienced by women with CVD combined with unique aspects of SCAD pathophysiology, clinical presentation, and treatment, present an opportunity to improve clinical care. In particular, little is known of women's trajectory of recovery after SCAD. Therefore, the primary purpose of this study was to explore women's descriptions of their recovery from SCAD, focusing on lifestyle management. The research question was: What can be learned from younger women's descriptions of their experiences regarding lifestyle management after being diagnosed with SCAD? We aimed to address the pressing need to focus scientific efforts on understanding women's experiences of SCAD and identify the implications for nursing practice.

Methods

Design

We conducted a study of women's self-reported experiences of their recovery from SCAD. We used interpretive description (ID), a qualitative methodology that allows applied science researchers to tailor qualitative inquiry design so as to answer clinically-based research questions (Thorne, 2016). In accordance with the applied approach inherent in ID, the logic model that drove data collection and analysis was derived from the applied research question, allowing the researcher to capture the context of a practice while orienting the data collection and analysis approach to participants' clinical characteristics (Thorne, 2016).

Sample, Setting, and Recruitment

We recruited participants through an outpatient SCAD clinic at a tertiary hospital in Vancouver, Canada. Currently, more than 800 patients are followed in the SCAD clinic. Patients were invited to participate if they were female sex, 55 years of age or younger at the time of their SCAD event, proficient in speaking English, and had a documented diagnosis of SCAD in the prior three to 18 months. Women who had experienced significant complications (e.g., stroke, severe arrhythmia), had a debilitating comorbidity that prevented participation in lifestyle management strategies (e.g., severe mental health condition, incapacity to mobilize), or had a previous diagnosis of ACS or recurrence of SCAD were excluded. Charts were pre-screened by the principal investigator (PI) and, over a period of six weeks, a total of 21 study information packages were distributed to potential participants, 14 by mail and seven given to patients at the time of their SCAD medical appointment. Each information package contained a recruitment flyer, the informed consent form, a letter from the SCAD cardiologist summarizing the study, and the PI's contact information.

Data Collection

Data were collected through one-on-one, in-depth interviews at a location chosen by the participant. The locations included community libraries, the participating hospital, the participant's home, and by telephone. The PI conducted all interviews using a semi-structured interview guide (see Appendix) to encourage participants to speak freely about their experiences with SCAD. Questions progressed from asking women to recall their experience of SCAD and early recovery, to focusing on lifestyle management, including the physical, mental, and social health domains of rehabilitation. Finally, participants were asked to provide their recommendations that would contribute to improved health service delivery or other components of the care of women with SCAD. The PI, who is an experienced cardiac registered nurse and has completed graduate level research courses, had no previous relationship with any of the study participants. Interviews lasted 35 to 50 minutes, were audio recorded, transcribed verbatim by a medical transcriptionist, and verified by the PI for accuracy. Data collection stopped when sufficient patterns and themes emerged from the data analysis to draw conclusions.

Data Analysis

Consistent with ID methodology, data analysis followed an iterative process involving concurrent data collection and analysis, with constant reflection, asking of questions, and considering all interpretive options (Thorne, 2013). Analysis was initially completed by the PI, and subsequently discussed and refined in consultation with the co-investigators. The first phase involved deep reading of the data set in its entirety over multiple iterations, then coding and grouping of key ideas using Microsoft Word to allow for a sense of frequency within the themes and patterns. In parallel, the PI documented the decision-making process and recorded reflections to derive a better understanding of the data, using an analytical log and practicing reflexivity to enhance credibility in the transparency of the analytic logic (Thorne, 2016). In the second phase, we worked as a team to compare insights, identify relationships between the emerging themes, and ensure the internal coherence of the findings. We then extracted exemplars from within the thematic categories to illustrate the observed patterns. Thus, data analysis was a collaborative process by all the authors, leading to consensus in the development of the final findings report.

Ethical Considerations

Research ethics approval for this study was obtained by the University of British Columbia's Behavioural Research Ethics Board (certificate H18-00065). Participants provided written informed consent prior to the interviews.

Results

From the 21 study packages distributed to women who met the inclusion criteria, seven women agreed to participate in the study. Four additional women, who contacted the PI expressing interest in participating, did not respond to follow-up emails or were unable to schedule an interview. Sufficient data saturation was reached with the seven participants to reveal thematic patterns, therefore no futher recruitment was required. The demographics of participants can be found in Table 1. Data analysis from the interviews revealed that, along the participants' illness trajectory, an over-arching theme emerged of being lost in an unfamiliar diagnosis. Additionally, four sub-themes were identified: 1) being diagnosed with a rare disease, 2) swirling in an information vacuum, 3) finding support, and 4) adjusting to and resuming a more normal life. In the subsequent quotations associated with the presentation of these themes, all participant identifiers have been removed; the quotations are presented verbatim and connected to the participant by number only.

Overarching Theme: Being Lost in an Unfamiliar Diagnosis

Subtheme: Being Diagnosed with a Rare Disease

Women in this study described feeling shocked and surprised by their medical emergency and subsequent diagnosis because they did not have typical cardiac risk factors for ACS, such as hypertension, diabetes, or an inactive lifestyle. They reported feeling "caught off guard" by their diagnosis, because of the sudden onset of SCAD, and felt that they did not "fit" the publicly recognizable image of people who have an acute myocardial infarction (AMI). Following the index event, the participants described having ongoing, confusing symptoms, which caused a lot of anxiety. When describing their initial symptoms, one participant shared: "And I didn't know. Like, it wasn't chest pain, and it wasn't like, full-on numbness or anything like that, so yeah, I totally thought it was just, like, a weird panic attack" [P3]. Later in their recovery, this confusion continued, "You know how many other times I wanted to go to the hospital, to just go there because I didn't know what was really going on?" [P3].

The exact causes of SCAD were not conveyed to the women. They perceived that healthcare providers (HCPs) were only able to provide tentative or partial information about their diagnosis, and that they had only limited understanding of SCAD, partially because it was so rare: "I would say—that's my huge thing, I think, is that if I would have known more right after it happened, I think I would have felt a lot better. But it was this unknown condition that I had, and I was told at the time that it was quite rare" [P5].

The women felt lost in their pursuit to explain how and why they had been labelled as heart attack patients. This caused them to struggle with managing their lives after their event. The participants suspected issues such as stress, high blood pressure, exercise, and/or heavy lifting had caused their SCAD; as a result, the women reported that they avoided these potential causes to prevent reoccurrence.

Subtheme: Swirling in an Information Vacuum

The study participants described feeling lost in their diagnosis of SCAD because they were not provided with definitive information about their disease, leaving them *swirling in an information vacuum*. The women shared they were not given sufficient information about SCAD at diagnosis, while in hospital, at the time of discharge, or while recovering at home. One woman shared: "And when you're in a situation like that, like, your anxiety and everything is going to increase, right, because you've got all this uncertainty and all this unknown" [P3]. Another participant spoke about the lack of information at discharge:

I didn't get a pamphlet of, 'Oh, so you've had a heart attack.' I didn't get any information of, like, what to do once I got home, like what my limitations were going to be,

| Table 1. Participant Demographics | | | | |
|-----------------------------------|-----|----------------|--------------------|---------------------|
| Participant | Age | Interview Type | Marital status | Employment |
| 1 | 44 | In person | Divorced/Separated | Sales |
| 2 | 52 | In person | Married | Courier |
| 3 | 48 | In person | Single | Unemployed |
| 4 | 54 | Telephone | Common-law | Health worker |
| 5 | 52 | In person | Married | Education Assistant |
| 6 | 42 | In person | Divorced/Separated | Education Assistant |
| 7 | 44 | Telephone | Divorced/Separated | Transcriptionist |

where do I go from here? Like, what is my aftercare, what medications can I or can I not have? Like, what OTC [over the counter medication] can I—am I allowed to have Tylenol, am I not? [P3].

Participants reported that they perceived what little information they were given in hospital to be inconsistent and vague. Once recovering at home, the information vacuum was further sustained by the lack of knowledge of their general practitioners (GP) and general cardiologists, who often deferred their questions to the SCAD cardiology specialist.

Well, he [general cardiologist] didn't—he's putting it all on [the SCAD specialist], I will admit. Every time I ask him something, 'Oh, [the SCAD specialist] would be the person to ask about this.' I don't know if he's not seen this very much. I don't know what it is. But he basically said, [the SCAD specialists]'s office is going to call you [P7].

As a result of not receiving information about SCAD from their GPs or general cardiologists, the participants relayed that they felt their lives were on hold while they waited four to eight months for a consultation with the SCAD cardiology specialist.

The doctors in the hospital referred me to [the SCAD specialist], sent in a referral, gave me her phone number and sent me home. I went to my family doctor within three days or a week, and she's just like, 'Oh, wow, that's crazy. Well, I know nothing about that, so you'll just have to wait to see your heart specialist.' And so I probably phoned [the SCAD specialist]'s assistant every two weeks for six months [P2].

The participants expressed that they needed to learn more about how SCAD heals, their activity restrictions, medications, symptoms, and treatment options, and when they could return to work. Preventing reoccurrence was reported as one of the biggest informational gaps that jeopardized their recovery and increased anxiety. One participant reflected back on what information would have been valuable for her in relation to recurrence: "I think knowing what has happened or why it happened will give you more tools to try to prevent it happening again" [P4].

Subtheme: Finding Support

Participants described finding different kinds of support, at different times during their recovery, which made them feel more in control of their recovery. Once the women identified what information they needed to move forward with their lives, they were able to begin to develop coping strategies, such as breathing exercises and keeping medications close by, and they started seeking out other forms of support. The participants described three main types of support that aided them in their recovery: seeing the SCAD specialist, attending a cardiac rehabilitation program (CRP), and accessing social media.

Participants described that the consultation with the SCAD cardiology specialist provided support by filling the information gap, providing a sense of clarity and dependable

knowledge that was grounding, and normalized their illness. At this medical appointment, the participants reported having their questions answered, which decreased their anxiety and uncertainty. One woman talked about how she felt after seeing the specialist:

I just felt better because I had more information, because it was really lack of information on—for me. Like, nobody really seemed to know anything about it ... you need to actually sit down and talk to—somebody actually needs to come talk to you, explain exactly what it—because I didn't fully understand what it was until much later [PS].

Participants also identified CRPs as a source of support. Most participants attended either a general or SCAD-specific CRP, or both in some cases. The participants generally had a good experience in these programs and reported that they received more information about their diagnosis within this forum. Additionally, the supervised programs provided an environment where the participants were supported by professionals. They felt safe and increasingly confident to perform aerobic exercise and to begin to resume their previously active lives. One woman shared: "So seeing that it was okay and what numbers to watch for, and any time I had any questions about anything, they were there to answer them. So I just felt much more informed" [P5].

Building on the success of their experience in the CRP, many women transitioned to exercising independently prior to the completion of their program. Many of the women only attended the CRP for a month or two, until they felt comfortable exercising on their own.

The third form of support mentioned by participants was the use of social media. Forums such as Facebook or SCAD webpages provided the women with the opportunity to connect with other SCAD survivors and read other people's stories. One participant recalled:

So the Facebook page was really, really good in reassuring me that I'm not the only one, because we're told that it's rare... I realized that there's a whole whack of us that were feeling the same thing, so it kind of made me feel a little bit better [P3].

Another participant described the benefit she received from social media: "But talking one-on-one with the people, like on the Facebook page, that was helpful—just—even just reading everything that they're saying, you know?" [P4].

Of note, the participants also identified several reasons why social media was not beneficial, including inconsistent and individualized information, an overwhelming amount of dialogue and information, and questionable reliability of information sources.

Subtheme: Adjusting to and Resuming a More Normal Life

After finding support, the participants were able to begin the process of adjusting to and resuming a more normal way of life, as they were now better equipped with the knowledge and confidence to resume some of their daily activities. Most of the participants were able to return to work, as long as their job was not too physically strenuous. They also started resuming some of their previous physical and social activities. One participant shared: "I had to change my mindset of not being fearful of what's going to happen, and still live my life to the best that I can. And that's what I've kind of been doing" [P6].

Another participant said: "Your life can go back to normal... Like, you don't have to be doing things on eggshells after this happens to you" [P7].

Nevertheless, the participants emphasized the need for ongoing informational support, which is lacking for this relatively rare condition in our current healthcare system.

Discussion

While SCAD is not a newly identified form of ACS, its true prevalence is unknown because of misdiagnosis and under disagnosis (Hayes et al., 2018; Saw et al., 2016). Additionally, SCAD is primarily confined to young women and, although evidence is emerging about risk factors, treatment, and outcomes, there is minimal research available to HCPs to better understand how women manage their lifestyle after their event. Based on the experiences shared by the study participants and the available literature on SCAD, it appears that SCAD survivors have a shared experience with other female patients diagnosed with ACS, but they also experience some unique features that need to be addressed within the heath care system.

Women with SCAD had experiences that mirrored what is known about women with ACS. First, women with atherosclerotic ACS experience a larger informational gap during diagnosis, hospitalization, discharge, and recovery from their event when compared to men (Galick et al., 2015; Hildingh et al., 2007; Stevens & Thomas, 2012). This may be related to both their unique informational needs and to the paucity of research that addresses women's unique needs after sustaining a heart attack (The Heart and Stroke Foundation of Canada, 2018). As a result of this gender bias, there is a gap in clinical care and research focused on women's experiences (Humphries & Pilote, 2018). The information gap reported in this study is, therefore, consistent with women's experience in the more generalized context of heart disease. Women who experience ACS as a result of atherosclerosis also report both a lack of awareness of their risk for heart disease, and a perception that HCPs are less likely to consider the possibility of ACS when they present for medical care (Almond et al., 2012; Galick et al., 2015; Leifheit-Limson et al., 2015; Murray et al., 2000). Women with ACS are often surprised when faced with the onset of heart disease, and struggle to understand the reasons for their diagnosis (Lacharity, 1999; Stevens & Thomas, 2012).

Similar to the participants in this study, the literature on atherosclerotic ACS reveals that women fear recurrence of

their heart attack and have a need to take steps to prevent it from happening again (Smith et al., 2017). Similarly, our participants identified how fear of recurrence of SCAD played a role in their recovery process, attributing this anxiety to feeling as if their lives were on hold. This concern is well founded, as the reported risk of a repeat event is as high as 30% of cases after 4- to10-year follow up (Nakashima et al., 2016; Saw, Aymong, Sedlak et al., 2014; Tweet et al., 2012; Tweet et al., 2014), while opportunities for risk reduction through health behaviour modification are limited due to the pathological processes.

Conversely, our study revealed there are distinct features of the experiences of women with SCAD. The goal of mitigating the risks for atherosclerotic ACS is to prevent the formation of atherosclerotic plaque by managing diabetes, smoking cessation, and following healthy diet and exercise guidelines/habits (The Heart and Stroke Foundation, 2017). However, SCAD research suggests that most patients do not experience high rates of these modifiable risk factors (Saw, Aymong, Sedlak et al., 2014). One study revealed that 70% of women with SCAD did not have any pre-existing cardiac risk factors (Saw et al., 2017), while another stated that, prior to their SCAD, women were typically physically active and were in good general health (Hayes, 2014). In contrast to atherosclerotic ACS, one of the biggest risk factors for SCAD is fibromuscular dysplasia (Saw, Aymong, Sedlak et al., 2014), which is not amenable to modification through behaviour change. The management of SCAD does not benefit from the guidance of well-established coronary artery disease guidelines and rests primarily on expert opinion (Saw, Aymong, Mancini et al., 2014; Saw, Aymong, Sedlak et al., 2014). In our study, the women's consistent experiences of GPs and cardiologists deferring to the opinion of the SCAD cardiology specialist and recommending that they wait for their consultation prior to increasing their activity may, in part, be explained by the absence of guideline-directed treatment. The availability of cardiologists with expertise in SCAD is a limiting factor, and there is a need to equip the larger primary care provider system with the requisite knowledge to support these women until they gain access to specialty advice. One possible solution to this challenge may be enhancing discharge communication, with direction on where practictioners can find supporting information about what SCAD patients require during their recovery. This could be created and supported by nurses or other healthcare professionals that specialize in SCAD.

The findings in this study reflect what has been reported in the literature on the experiences of patients with other rare diseases. Several studies on rare diseases have also reported that informational and emotional needs are the highest priority for patients. Additionally, patients with rare diseases have also reported that the HCPs, from whom they would normally obtain care, have limited knowledge about their diagnosis, and reliable information is scarce (Baumbusch et al., 2019; Currie & Szabo, 2019; Germeni et al., 2018). As a result, patients with rare diseases tend to become experts in their illness, taking an active part in decision-making about their diagnosis and management to improve their health and outcomes (Baumbusch et al., 2019; Currie & Szabo, 2019; Morel & Cano, 2017). This is highly pertinent to SCAD survivors, who may benefit from support to develop an increased sense of agency. As well, women's need for peerto-peer support may be met through the judicious use of social media (Baumbusch et al., 2019) to help address the sense of isolation associated with SCAD. Finally, women with SCAD report significant stress and impaired coping related to the sudden onset of their condition, and their subsequent high degree of uncertainty about the implications for lifestyle management (Wagers et al., 2018). The perception of insufficient emotional support from HCPs and the deleterious impact on mental health seem in keeping with the reported experience of patients with other rare diseases (Baumbusch et al., 2019; Wallenius et al., 2009).

Limitations

We acknowledge this study has several limitations, including the recruitment of all participants from a single-centre, specialized SCAD clinic. Additionally, participants were volunteers, which may have impacted on the results. The sample size was small; however, our analysis revealed consistency among the participants' experiences after their SCAD, and supported data saturation. Although our sample was a relatively homogeneous group of Caucasian women, previous studies have also found patients diagnosed with SCAD are most frequently younger females of European descent (Saw, Aymong, Sedlak et al., 2014; Tweet et al., 2012).

Implications for Nursing Practice and Research

Our findings highlight gaps that could be addressed by implementing interdisciplinary care, which utilizes the full scope of nursing practice to augment the delivery of specialized cardiology patient care. The role of the advanced practice nurse (APN) is particularly well suited to fulfill this function by providing case management. Such comprehensive care could attend to all aspects of women's recovery by coordinating and streamlining processes, thus contributing to accelerated recovery and improved outcomes. Given the domains of APN's practice (Canadian Nurses Association, 2014), potential roles for cardiovascular APNs in the care of women with SCAD include improving and evaluating the discharge process for women after initial SCAD diagnosis. In addition, APNs could coordinate the transition from the hospital to the community setting, to include facilitating access to a SCAD cardiologist, designing and implementing education resources and programs for the healthcare team and SCAD survivors, and facilitating access to peer-led support groups. APNs can also play a key role in facilitating research in this area.

Women with SCAD require a system that is responsive and tailored to their individual needs and reflects emerging evidence. Therefore, further research could focus on the specifics of informational needs and timelines, CRPs for SCAD patients, and indepth exploration of women with SCAD's social-emotional needs after their event. Having a deeper, more robust understanding of the specifics of women's experiences after SCAD could inform the development of patient-centred guidelines and achieve the goal of optimal outcomes for this population.

Conclusion

This study found that, following SCAD, women had a shared experience of feeling lost in this relatively rare diagnosis. The study participants reported unmet information needs in the early phase, found strategies that enabled them to feel increasingly anchored and able to move on, and provided advice for improving care delivery. These findings provide an important contribution to SCAD research and augment current evidence. The role of a cardiovascular APN would be ideally suited to address the current challenges women face with managing their lifestyle after SCAD.

Acknowledgements and Disclaimers

We wish to acknowledge Dr. J. Saw for her support with this research study.

REFERENCES

- Almond, S. C., Salisbury, H., & Ziebland, S. (2012). Women's experience of coronary heart disease: Why is it different? *British Journal of Cardiac Nursing*, 7(4), 165–170. https://doi.org/10.12968/bjca.2012.7.4.165
- Baumbusch, J., Mayer, S., & Sloan-Yip, I. (2019). Alone in a crowd? Parents of children with rare diseases' experiences of navigating the healthcare system. *Journal of Genetic Counseling*, 28(1), 80–90. https://doi. org/10.1007/s10897-018-0294-9
- Canadian Institute of Health Research. (2019). Sex, gender and health research. https://cihr-irsc.gc.ca/e/50833.html
- Canadian Nurses Association. (2014). Pan-Canadian core compentencies for the clinical nurse specialist. https://cna-aiic.ca/~/media/cna/files/en/ clinical_nurse_specialists_convention_handout_e.pdf
- Currie, G., & Szabo, J. (2019). "It is like a jungle gym, and everything is under construction": The parent's perspective of caring for a child with a rare disease. *Child: Care, Health and Development,* 45(1), 96–103. https://doi.org/10.1111/cch.12628
- Galick, A., D'Arrigo-Patrick, E., & Knudson-Martin, C. (2015). Can anyone hear me? Does anyone see me? A qualitative meta-analysis of women's experiences of heart disease. *Qualitative Health Research*, 25(8), 1123–1138. https://doi.org/10.1177/1049732315584743
- Germeni, E., Vallini, I., Bianchetti, M. G., & Schulz, P. J. (2018). Reconstructing normality following the diagnosis of a childhood chronic disease: Does "rare" make a difference? *European Journal of Pediatrics*, 177(4), 489–495. https://doi.org/10.1007/s00431-017-3085-7

Women's Descriptions of Their Experiences of Lifestyle Management after Spontaneous Coronary Artery Dissection

- Hayes, S. N. (2014). Spontaneous coronary artery dissection (SCAD): New insights into this not-so-rare condition. *Texas Heart Institute Journal*, 41(3), 295–298. https://doi.org/10.14503/THIJ-14-4089
- Hayes, S. N., Kim, E. S. H., Saw, J., Adlam, D., Arslanian-Engoren, C., Economy, K. E., Ganesh, S. K., Gulati, R., Lindsay, M. E., Mieres, J. H., Naderi, S., Shah, S., Thaler, D. E., Tweet, M. S., & Wood, M. J. (2018). Spontaneous coronary artery dissection: Current state of the science: A scientific statement from the American Heart Association. *Circulation (New York, N.Y.), 137*(19), e523–e557. https://doi.org/10.1161/cir.00000000000564
- Hildingh, C., Fridlund, B., & Lidell, E. (2007). Women's experiences of recovery after myocardial infarction: A meta-synthesis. *Heart & Lung*, 36(6), 410. https://doi.org/10.1016/j.hrtlng.2007.02.008
- Hill, S. F., & Sheppard, M. N. (2010). Non-atherosclerotic coronary artery disease associated with sudden cardiac death. *Heart*, 96(14), 1119– 1125. https://doi.org/10.1136/hrt.2009.185157
- Humphries, K. H., Izadnegadar, M., Sedlak, T., Saw, J., Johnston, N., Schenck-Gustafsson, K., Shah, R. U., Regitz-Zagrosek, V., Grewal, J., Vaccarino, V., Wei, J., & Bairey Merz, C. N. (2017). Sex differences in cardiovascular disease: Impact on care and outcomes. *Frontiers in Neuroendocrinology*, 46, 46–70. https://doi.org/10.1016/j. yfrne.2017.04.001
- Humphries, K. H., & Pilote, L. (2018). Research in women's cardiovascular health—Progress at last? *Canadian Journal of Cardiology*, 34(4), 349–353. https://doi.org/10.1016/j.cjca.2017.10.019
- Lacharity, L. A. (1999). The experiences of younger women with coronary artery disease. *Journal of Women's Health & Gender-Based Medicine*, 8(6), 773–785. https://doi.org/10.1089/152460999319101
- Leifheit-Limson, E. C., D'Onofrio, G., Daneshvar, M., Geda, M., Bueno, H., Spertus, J. A., Krumholz, H. M., & Lichtman, J. H. (2015). Sex differences in cardiac risk factors, perceived risk, and health care provider discussion of risk and risk modification among young patients with acute myocardial infarction: The VIRGO study. *Journal of the American College of Cardiology*, 66(18), 1949. https://doi.org/10.1016/j. jacc.2015.08.859
- Morel, T., & Cano, S. J. (2017). Measuring what matters to rare disease patients: Reflections on the work by the IRDiRC Taskforce on patient-centered outcome measures. *Orphanet Journal of Rare Diseases*, 12(1), 171–13. https://doi.org/10.1186/s13023-017-0718-x
- Murray, J. C., O'Farrell, P., & Huston, P. (2000). The experiences of women with heart disease: What are their needs? *Canadian Journal of Public Health*, 91(2), 98-102. https://doi.org/10.1007/BF03404919
- Nakashima, T., Noguchi, T., Haruta, S., Yamamoto, Y., Oshima, S., Nakao, K., Taniguchi, Y., Yamaguchi, J., Tsuchihashi, K., Seki, A., Kawasaki, T., Uchida, T., Omura, N., Kikuchi, M., Kimura, K., Ogawa, H., Miyazaki, S., & Yasuda, S. (2016). Prognostic impact of spontaneous coronary artery dissection in young female patients with acute myocardial infarction: A report from the angina pectoris-myocardial infarction multicenter investigators in Japan. *International Journal of Cardiology*, 207, 341. https://doi.org/10.1016/j.ijcard.2016.01.188
- National Institute of Health. (2017, November 28). Amendment: NIH policy and guidelines on the inclusion of women and minorities as subjects in clinical research. NOT-OD-18-014: Revision: NIH Policy and Guidelines on the Inclusion of Women and Minorities as Subjects in Clinical Research
- Nishiguchi, T., Tanaka, A., Ozaki, Y., Taruya, A., Fukuda, S., Taguchi, H., Iwaguro, T., Ueno, S., Okumoto, Y., & Akasaka, T. (2016). Prevalence of spontaneous coronary artery dissection in patients with acute coronary syndrome. *European Heart Journal: Acute Cardiovascular Care,* 5(3), 263–270. https://doi.org/10.1177/2048872613504310
- Rashid, H. N. Z., Wong, D. T. L., Wijesekera, H., Gutman, S. J., Shanmugam, V. B., Gulati, R., Malaipan, Y., Meredith, I. T., & Psaltis, P. J. (2016). Incidence and characterisation of spontaneous coronary artery dissection as a cause of acute coronary syndrome: A single-centre Australian experience. *International Journal of Cardiology*, 202, 336–338. https://doi.org/10.1016/j.ijcard.2015.09.072

- Rosenfeld, A. G., & Gilkeson, J. (2000). Meaning of illness for women with coronary heart disease. *The Journal of Acute and Critical Care,* 29(2), 105–112. https://doi.org/10.1016/S0147-9563(00)90005-0
- Saw, J., Aymong, E., Mancini, G. B. J., Sedlak, T., Starovoytov, A., & Ricci, D. (2014). Nonatherosclerotic coronary artery disease in young women. *Canadian Journal of Cardiology*, 30(7), 814–819. https://doiorg.ezproxy.library.ubc.ca/10.1016/j.cjca.2014.01.011
- Saw, J., Aymong, E., Sedlak, T., Buller, C. E., Starovoytov, A., Ricci, D., Robinson, S., Vuurmans, T., Gao, M., Humphries, K., & Mancini, G. B. J. (2014). Spontaneous coronary artery dissection: Association with predisposing arteriopathies and precipitating stressors and cardiovascular outcomes. *Circulation*, 7(5), 645–655. https://doi.org/10.1161/ CIRCINTERVENTIONS.114.001760
- Saw, J., Humphries, K., Aymong, E., Sedlak, T., Prakash, R., Starovoytov, A., & Mancini, G. B. J. (2017). Spontaneous coronary artery dissection. *Journal of the American College of Cardiology*, 70(9), 1148–1158. https://doi.org/10.1016/j.jacc.2017.06.053
- Saw, J., Mancini, G. B. J., & Humphries, K. H. (2016). Contemporary review on spontaneous coronary artery dissection. *Journal of the American College of Cardiology*, 68(3), 297–312. https://doi.org/10.1016/j. jacc.2016.05.034
- Saw, J., Ricci, D., Starovoytov, A., Fox, R., & Buller, C. E. (2013). Spontaneous coronary artery dissection: Prevalence of predisposing conditions including fibromuscular dysplasia in a tertiary center cohort. *Cardiovascular Interventions*, 6(1), 44. https://doi.org/10.1016/j. jcin.2012.08.017
- Smith, R., Frazer, K., Hall, P., Hyde, A., & O'Connor, L. (2017). 'Betwixt and between health and illness:' Women's narratives following acute coronary syndrome. *Journal of Clinical Nursing*, 26(21–22), 3457– 3470. https://doi.org/10.1111/jocn.13711
- Stevens, S., & Thomas, S. P. (2012). Recovery of midlife women from myocardial infarction. *Health Care for Women International*, 33(12), 1096– 1113. https://doi.org/10.1080/07399332.2012.684815
- The Heart and Stroke Foundation of Canada. (2017). *Heart: Recovery and support*. http://www.heartandstroke.ca/heart/recovery-and-support
- The Heart and Stroke Foundation of Canada. (2018). *Ms. Understood.* hs_2018-heart-report_en.ashx (heartandstroke.ca)
- Thorne, S. (2013). Interpretive description. In C. T. Beck (Ed.), *Routledge international handbook of qualitative nursing research* (pp. 295–306). Routledge.
- Thorne, S. (2016). *Interpretive description: Qualitative research for applied practice* (2nd ed.). Routledge.
- Tweet, M. S., Eleid, M. F., Best, P. J. M., Lennon, R. J., Lerman, A., Rihal, C. S., Holmes, D. R., Jr., Hayes, S. N., & Gulati, R. (2014). Spontaneous coronary artery dissection: Revascularization versus conservative therapy. *Circulation: Cardiovascular Interventions*, 7(6), 777–786. https://doi.org/10.1161/CIRCINTERVENTIONS.114.001659
- Tweet, M. S., Gulati, R., & Hayes, S. N. (2015). What clinicians should know about spontaneous coronary artery dissection. *Mayo Clinic Proceedings*, 90(8), 1125. https://doi.org/10.1016/j.mayocp.2015.05.010
- Tweet, M. S., Hayes, S. N., Pitta, S. R., Simari, R. D., Lerman, A., Lennon, R. J., Gersh, B. J., Khambatta, S., Best, P. J. M., Rihal, C. S., & Gulati, R. (2012). Clinical features, management, and prognosis of spontaneous coronary artery dissection. *Circulation*, 126(5), 579. https:// doi.org/10.1161/CIRCULATIONAHA.112.105718
- Wagers, T. P., Stevens, C. J., Ross, K. V., Leon, K. K., & Masters, K. S. (2018). Spontaneous coronary artery dissection (SCAD): Female survivors' experiences of stress and support. *Journal of Cardiopulmonary Rehabilitation and Prevention*, 38(6), 374–379. https://doi. org./10.1097/HCR.0000000000330
- Wallenius, E., Möller, K., & Berglund, B.(2009). Everyday impact of having a rare diagnosis. A questionnaire study. Vård i Norden, 29(3), 13–17. https://doki.org/10.1177/010740830902900304
- World Health Organization. (2017, May 17). Cardiovascular disease (CVDs). http://www.who.int/mediacentre/factsheets/fs317/en/

Appendix: Interview Questions

Introductory questions:

- 1. Please tell me more about yourself. For example: where do you live, what is your occupation, who do you live with? And anything else about you that you would like to share.
- 2. Describe for me what happened around the time when you started experiencing SCAD. (Prompts: What were you doing? What did you feel physically and emotionally? What was your reaction initially? What did you do? What were you told at the hospital? What did you think/feel when you found out it was a heart attack/SCAD? Did you have PCI or conservative treatment?)

Lifestyle management questions:

- 1. How did you feel at the time of your discharge from the hospital? (Prompts: Were you ready to leave? Why or why not? Did you feel you had the knowledge to leave? What were your biggest worries? Was there anything that made you feel better about going home? Did you feel supported?)
- 2. How would you describe your emotions between after your discharge from hospital and now? (Prompts: How did you respond to these emotions? What did you do about them? What helped you emotionally?)
- 3. Please describe for me your experiences with changing lifestyle after being diagnosed with SCAD? More specifically, what changed for you when you went home after SCAD? (Prompts: How did the changes you are describing make you feel? How did the emotions you described in the last question influence your ability to make lifestyle changes? Please tell me more about the support you received or didn't receive to help you make changes to your lifestyle?
- 4. What influenced your decision to attend/to not attend a cardiac rehabilitation program? (Prompts: Did you attend? Where did you attend?)
- 5. For those who attended CRP: What were the benefits of CRP? What did you think was missing?
- 6. If you could describe one thing that you would like newly diagnosed women with SCAD to know about managing their lifestyle, what would that be?

Delirium Pharmacotherapeutics in the Cardiac Intensive Care Unit: An Alphabetical Mnemonic Approach

Mohamed El Hussein, RN, PhD, NP^{1,2,3*} & Shani Markus, BN Student¹

¹School of Nursing and Midwifery Mount Royal University ²Faculty of Nursing, University of Calgary ³Medical Cardiology, Coronary Care Unit, Rockyview General Hospital, Calgary, AB

*Corresponding address: 4825 Mount Royal Gate S.W., Calgary, AB T3E 6K6 Email: melhussein@mtroyal.ca; https://twitter.com/drmohamednp

Abstract

Older adults are at increased risk of experiencing cardiovascular diseases, resulting in admissions to the medical cardiac intensive care unit (CICU) for advanced monitoring and interventions. Delirium has a complex etiology, caused by modifiable factors imposed on underlying medical or surgical conditions. The CICU environment is notorious for its delirium-inducing factors, such as receiving certain cardiac medications, lacking sleep, and undergoing medical procedures. More than half of patients with delirium experience agitation symptoms, posing a safety risk to the patient and the healthcare team involved and contributing to prolonged hospital stays. Nurses in the CICU are faced with the challenge of preventing and treating underlying causes of delirium and controlling delirium manifestations to protect their patients. We propose an alphabetical mnemonic, based on guideline-driven pharmacological interventions (ABCD: antipsychotics, benzodiazepines, cholinesterase inhibitors, and dexmedetomidine), to facilitate nurses' understanding and recall of pharmacotherapy used in the complex management of delirium in the CICU.

Key words: delirium, CICU, cardiovascular, antipsychotics, nursing

El Hussein, M., & Markus, S. (2021). Delirium Pharmacotherapeutics in the Cardiac Intensive Care Unit: An Alphabetical Mnemonic Approach. Canadian Journal of Cardiovascular Nursing, 31(2), 14–19.

Key Highlights

- Delirium is a threat to patient safety and is associated with increased morbidity and mortality in the CICU patient population
- We offer the ABCD mnemonic (antipsychotics, benzodiazepines, cholinesterase inhibitors, and dexometodimine) as a tool to facilitate recall and application of delirium pharmacotherapy in the clinical CICU setting
- Nurses caring for delirious patients in the CICU must be familiar with the current evidence and potential cardiac effects of the medications used to manage delirium.

Background

Delirium is a common problem in patients admitted to acute care settings in general, and the medical cardiac intensive care unit (CICU) in particular (El Hussein & Hirst, 2016). Delirium is a reversible state of cognitive impairment or imbalance that may arise in patients battling critical illnesses (Burry et al., 2019). In a North American cross-sectional study (N = 590), delirium was present in 20.3% of CICU patients and was associated with increased mortality (p <.001) and an increased length of hospital stay (p = .001; Pauley et al., 2015). More than half of patients with delirium experience agitation symptoms, posing a safety risk to the patient and the healthcare team involved (Hui, 2017). Given the high incidence of delirium and the associated adverse complications, CICU nurses must be familiar with delirium pharmacological treatment to protect patients' safety and to enhance their quality of care.

Advancing age is a non-modifiable risk factor for delirium and with current improvements in cardiac healthcare, more frail older adults are being admitted to the CICU (Ibrahim et al., 2018). The intersectionality of advanced age and CICU treatment/environmental factors predisposes patients to the development of delirium (Ibrahim et al., 2018). Delirium is etiologically multifactorial, but reversible. It is characterized by variation in cognition and attention deficit. Delirious patients exhibit different levels of motor activity, visual hallucinations, delusions, and sleep disturbances (El Hussein & Hirst, 2015). Delirium is often precipitated by the worsening of modifiable risk factors that disrupt the cognitive balance of patients already suffering from underlying, non-modifiable health conditions (see Table 1). Modifiable disturbances may be as simple as infections or medication changes (Ibrahim et al., 2018).

| Table 1. Risk Factors for Delirium | | | |
|---|--|--|--|
| Non-Modifiable | Modifiable – General | CICU Specific | |
| Advanced age Baseline cognitive impairment Previous history of delirium High comorbidity Chronic renal disease Chronic liver disease | Sensory impairment (hearing/vision) Immobilization Medications Sleep deprivation Pain Intercurrent illness (e.g., infection) Electrolyte imbalance Surgery Environment Emotional distress | Mechanical support or transcutaneous pacing Post transcatheter aortic valve replacement (TAVR) patients Therapeutic hypothermia post cardiac arrest Anti-arrhythmic agents Heart failure | |
| Note. Ibrahim et al., 2018; Pauley et al., 2015 | | | |

The duration of time a patient is delirious contributes to a deterioration in cognitive function for up to 12 months after discharge from CICU (van Eijk, 2010). Unfortunately, definitive pharmacologic management to prevent or shorten the duration of delirium has not been identified due to conflicting recommendations of guidelines and the side effects associated with delirium pharmacotherapy. The purpose of this manuscript is to provide an overview of current evidence related to delirium pharmacotherapy to facilitate CICU nurses' understanding of the medications used for the complex delirious patient.

Overview of Delirium

Delirium as a cognitive dysfunction may last hours to days and is often the result of another underlying general medical condition (Devlin et al., 2018). Based on-the patients' motor activity, delirium is classified into hypoactive, hyperactive, and mixed. Hypoactive delirium is estimated to be the most frequent type, occurring approximately in 65% of cases. Patients with hypoactive delirium may be overlooked due to their disinterest, lethargy, and quiet behaviours, which may be mistaken for depression (Simeone et al., 2018). Patients with hyperactive delirium often present with aggressiveness, agitation, delusional behaviour, and heightened arousal. Hyperactive delirium increases the risk of several health consequences, especially when patients inadvertently tamper with their medical care (e.g., removing catheters, venous access, drainage devices). A patient with mixed delirium experiences both hypoactive and hyperactive manifestations. (Simeone et al., 2018).

Based on a recent systematic review of delirium management in critical care settings, Burry et al. (2019) recommended non-pharmacological management of delirium first, such as reorientation, normalization of the sleep cycle, and early mobilization. Nonetheless, pharmacological interventions should be considered if these strategies fail to work, especially if the patients' safety is at risk (Ibrahim

| Table 2. Risk Factors for QTc Prolongation |
|--|
| Heart disease or cardiac abnormalities (i.e., arrhythmias, left ventricular hypertrophy) Age 65 years+ Female sex QT-prolonging agent Increased contraction of offending agent (e.g., high doses, overdose, drug interactions, or reduced clearance) Electrolyte abnormalities (e.g., hypokalemia, hypomagnesaemia) Bradycardia Genetic factors or congenital QT syndrome |
| <i>Note</i> . Barr et al., 2013; Funk et al., 2020 |

et al., 2018). The practitioner will determine when to initiate the pharmacological management of delirium, considering the degree of symptoms and patient safety (Devlin et al., 2018).

Unfortunately, medications used to control hyperactive delirium are often associated with dangerous cardiovascular side effects, such as QTc prolongation (Funk et al., 2020). Importantly, patients in the CICU tend to be at higher risk of developing a prolonged QTc interval because of their age and cardiac disease (see Table 2). Prolongation of the QT interval may lead to ventricular arrhythmias (e.g., Torsade de Pointes [TdP]) and cardiac death (Funk et al., 2020). There is no specific QTc interval that prevents the practitioner from prescribing delirium-controlling medications. However, a risk/benefit analysis should be considered when medicating delirious patients with a concurrent prolonged QTc interval. In general, medications used to treat delirium may also induce unfavourable cardiac issues, such as bradycardia and hypotension (Ibrahim et al., 2018). Therefore, CICU nurses should be aware of the risks and adverse effects of these medications in order to monitor their patients effectively.

The ABCD Mnemonic

To facilitate nurses' knowledge and understanding of current evidence related to the optimal pharmacological management of delirium among cardiac medical patients in the CICU, the authors developed the mnemonic "ABCD" (i.e., antipsychotics, benzodiazepines, cholinesterase inhibitors, dexmedetomidine). Mnemonics are tools used to help in memory recall and improve patients' healthcare outcomes (El Hussein et al., 2018; El Hussein et al., 2020). The following is an overview of the ABCD pharmacological options typically used to treat delirium in the CICU. Notably, the order is purely alphabetical and not meant to imply any type of hierarchical classification.

Antipsychotics

Both typical and atypical antipsychotics are prescribed for delirium in the CICU. While typical antipsychotics -antagonize dopamine D_2 neuroreceptors to alleviate psychotic symptoms, atypical antipsychotics (i.e., second-generation antipsychotics) are considered serotonin–dopamine antagonists (SDAs; Im et al., 2020). Generally, atypical antipsychotics are better tolerated by patients (Abraham et al., 2020) and produce fewer extrapyramidal side effects (e.g., dystonia, akathisia). Given the potentially harmful side effects of typical and atypical antipsychotic medications, it is especially important for the CICU healthcare team to be aware of the current lack of conclusive evidence and the equivocal recommendations regarding the effectiveness of antipsychotics for delirium management.

Typical Antipsychotics

Haloperidol (Haldol) is a commonly used, typical antipsychotic medication (Burry et al., 2019). Current ICU delirium guidelines recommend that haloperidol not be used in treating or preventing delirium, because its use may result in unfavourable consequences, such as QTc prolongation and extrapyramidal effects (Devlin et al., 2018; Ibrahim et al., 2018). These guidelines, however, suggest that delirious patients with agitation, hallucinations, and delusions may benefit from short-term haloperidol use (Devlin et al., 2018). Moreover, in a small, double-blind, placebo-controlled pilot study (N = 68) of mechanically ventilated patients with delirium, haloperidol was not associated with reducing delirium duration or first-time delirium onset, but patients had significantly fewer agitation hours per day than the placebo group (p = 0.008; Al-Qadheeb et al., 2016). However, in a much larger, longitudinal study examining delirium treatment and consequences in coronary care unit (CCU) patients (N = 11,079), Naksuk et al. (2017) determined that haloperidol is safe for administration in the CCU in low doses and is associated with a non-statistically significant QTc interval prolongation. Naksuk et al. (2017) concluded that patients who received haloperidol were not at higher risk of experiencing ventricular arrhythmias or in-hospital mortality. Overall the available evidence provides mixed messages and is inconclusive regarding haloperidol use to manage delirium.

Atypical Antipsychotics

Similar to haloperidol, to date, evidence-based ICU guidelines for managing delirium have not recommended the use of atypical antipsychotic drugs (e.g., risperidone [Risperdal], quetiapine [Seroquel], ziprasidone [Geodon]), as their risks generally outweigh their benefits (Barr et al., 2013; Devlin et al., 2018). These risks include undesirable cardiovascular effects, such as prolonged QTc intervals, ventricular arrhythmias, and orthostatic hypotension (Barr et al., 2013). As well, the more recent evidence-based guidelines concluded that atypical antipsychotics neither shorten delirium duration nor reduce patient mortality (Devlin et al., 2018). However, despite their recommendations, the recent guidelines do suggest that atypical antipsychotics may be beneficial for short-term distressing symptoms of delirium (Devlin et al., 2018).

More recent research on the cardiovascular effects of atypical antipsychotics does, however, suggest promising outcomes (Abraham et al., 2020; Mangan et al., 2018; Naksuk et al., 2017). In a retrospective chart review study (N=154), Mangan et al. (2018) determined that quetiapine treatment may be titrated quickly to a higher dose with minimal concerns for QTc prolongation. Based on a small intervention study (N = 59), Abraham et al. (2020) concluded that lowdose quetiapine was not associated with ventricular arrhythmias or increased all-cause mortality in CCU patients. Of note, in Naksuk et al.'s (2017) study, delirium was evaluated using the Confusion Assessment Method for the ICU (CAM-ICU) tool. This highlights the importance of adopting and implementing a validated delirium screening tool in the CICU (Devlin et al., 2018).

Benzodiazepines

Although administration of benzodiazepines, such as lorazepam (Ativan), has been associated with increased incidence of delirium in critical care patients (Burry et al., 2019), the use of benzodiazepines in agitated delirium remains supported by the literature (Hui, 2017). For example, in a double-blind RCT (N = 90 palliative care patients), Hui et al. reported that agitation, measured by the Richmond Agitation Sedation Scale (RASS), decreased significantly (p < .001) with the administration of lorazepam compared to placebo and haloperidol.

Benzodiazepines have, however, been associated with negative cardiac effects, including low blood pressure and depressed postural control immediately, and 24 hours after their use, leading to orthostatic hypotension and an increased risk for falls (Rivasi et al., 2020). Therefore, the use of benzodiazepines to manage delirium in the CICU must be carefully executed, particularly in older adults (Rivasi et al., 2020).

Cholinesterase Inhibitors

Cholinesterase inhibitors, such as rivastigmine [Exelon] and donepezil [Aricept], are used to treat dementia and have also been trialed in delirium management (Yu et al., 2018).

Based on the hypothesis that a deficit in cholinergic transmission may cause delirium and dementia, cholinesterase inhibitors are prescribed to block the metabolism of acetylcholine in the synapse, thus increasing its activity and improving cognitive function (Yu et al., 2018). Despite these pathological hypotheses, the results of research studies investigating the impact of cholinesterase inhibitors on delirious patients have not shown promising effects (Tampi et al., 2016; Yu et al., 2018). For example, when rivastigmine is prescribed simultaneously with haloperidol, it has been shown to increase the severity of delirium and mortality in critically ill patients (Yu et al., 2018). In a RCT (N = 404) conducted by van Eijk et al. (2010), patients diagnosed with delirium in the ICU were prescribed rivastigmine or placebo/haloperidol. This trial was stopped at 104 patients due to an increased mortality rate in the rivastigmine group (van Eijk, 2010). Specific to cardiac effects, research has shown that donepezil administration may cause QTc prolongation, increasing the risk of TdP (Malone & Hancox, 2020). Therefore, current guidelines do not recommend cholinesterase inhibitors to manage delirium in critical care settings (Devlin et al., 2018).

Dexmedetomidine

Dexmedetomidine (Precedex), which is an A₂-adrenergic agonist, appears to have a promising role in delirium management, especially in ICU settings (Ibrahim et al., 2018). It is an FDA-approved alternative to traditional sedatives, such as propofol and benzodiazepines (Ibrahim et al., 2018). However, research evidence remains inconclusive. In a meta-analysis by Liu et al. (2017), dexmedetomidine was associated with a lower risk of delirium in post-cardiac-surgery patients when compared to propofol. A recent Canadian RCT (dexmedetomidine versus placebo; N = 100; Skrobik et al., 2018) lends additional support for using dexmedetomidine to reduce delirium in ICU patients. However, a larger RCT (dexmedetomidine versus placebo, N = 798) recently reported that dexmedetomidine did not reduce the incidence of delirium in post-cardiac-surgery patients (Turan et al., 2020). In addition, while several studies have reported negative cardiac effects, such as bradycardia, hypotension, and heart block with dexmedetomidine use (Martin et al. 2003; Riker et al., 2009), others have found no significant cardiac effects compared to placebo (Skrobik et al., 2018).

Implications for Nurses

While the proposed mnemonic is a helpful tool for nurses to recall common drugs used to control delirium symptoms, pharmacotherapy should be reserved for patients who are a threat to their own safety or the safety of others. The selection of drug therapy must be individualized, based on the patient's medical history and current illness. Pharmacotherapy should be the last resort in treating delirium and should not be administered to delirious patients who have not been thoroughly examined and evaluated. Nurses play a central role in advocating for their patients to ensure that evidence-based clinical practice guidelines are followed for prescribing any of the ABCD medications, as well as in the assessment and monitoring of these patients.

Patients in CICU with delirium are typically experiencing cardiovascular issues, and the administration of anti-delirium medications increases their risk of developing various side effects, particularly those that are cardiac-related (Ibrahim et al., 2018). Therefore, CICU nurses must be aware of the potential risks of the medications and prioritize their cardiac assessment accordingly, including the monitoring of the ECG rhythms for ventricular arrhythmias in general and *TdP*, particularly in patients on risperidone [Risperdal], quetiapine [Seroquel], ziprasidone [Geodon]) and Haloperidol (Haldol; Funk et al., 2020). Nurses must also be vigilant in performing volume status evaluation in patients receiving dexmedetomidine, as hypovolemia tends to cause hypotensive/bradycardic effects (Ibrahim et al., 2018).

Nurses should also monitor and report additional specific drug-related side-effects, such as extrapyramidal side effects in patients on typical antipsychotics (e.g., Haldol). Switching medications, lowering the prescribed dose, or stopping the medication may be necessary (Kameg & Champion, 2021). In patients receiving benzodiazepines and dexmedetomidine, monitoring hepatic and renal function should be part of the plan of care. For example, because of the hepatic metabolism of dexmedetomidine, patients with liver dysfunction may require a lower dose to achieve a similar response, and liver function should be routinely assessed (Ungarian et al., 2019).

Patient safety may be at risk for patients on any of the ABCD medications.

Specific to patients on cholinesterase inhibitors, because dizziness is a common adverse effect, nurses should ensure patient safety by closely monitoring patient ambulation and gait (Yu et al., 2018). Nurses must also be aware of the side effects of benzodiazepines, such as hypotension and sedation, as this may influence patient safety (Rivasi et al., 2020). In patients receiving dexmedetomidine, the dose should be titrated to maintain a targeted sedation score to ensure that the patient is not over sedated (Ungarian et al., 2019).

Regular delirium assessment is fundamental to prevention, early detection, management, and optimal outcomes. According to the recent guidelines, "critically ill adults should be regularly assessed for delirium using a valid tool" (Devlin et al., 2018, p. e843). Although delirium assessment tools have not been perfected, tools such as the CAM-ICU or ICDSC are commonly used in research and clinical practice (Devlin et al., 2018). Educating nurses in using these tools is central to improving consistency in detecting and monitoring delirium in CICU patients (El Hussein et al., 2021). Nursing efforts to predict delirium in CICU patients should be part of a scheduled assessment.

Finally, nurses should also pay close attention to the patients' history, changes in medications, laboratory values,

and physical examination findings to determine which patients are at risk of delirium. Using prevention efforts in patients at risk decreases delirium incidence, hospital costs, and poor outcomes (Ibrahim et al., 2018). Nurses should be deliberate about initiating nonpharmacologic delirium prevention strategies, such as reorientation, early mobilization, and promoting regular sleep-wake cycles in the CICU (Ibrahim et al., 2018). Once a patient is diagnosed with delirium, it is imperative to identify and treat the underlying causes. After the causative factors are addressed, the nursing focus should once again shift to nonpharmacologic measures.

REFERENCES

- Abraham, M. P., Hinds, M., Tayidi, I., Jeffcoach, D. R., Corder, J. M., Hamilton, L. A., Taylor, J. E., & McMillen, J. C. (2020). Quetiapine for delirium prophylaxis in high-risk critically ill patients. *The Surgeon*. https://doi.org/10.1016/j.surge.2020.02.002
- Al-Qadheeb, N. S., Skrobik, Y., Schumaker, G., Pacheco, M., Roberts, R., Ruthazer, R., & Devlin, J. W. (2016). Preventing ICU subsyndromal delirium conversion to delirium with low dose IV haloperidol: A double-blind, placebo-controlled pilot study. *Critical Care Medicine*, 44(3), 583. https://doi.org/10.1097/CCM.000000000001411
- Barr, J., Fraser, G. L., Puntillo, K., Ely, E. W., Gélinas, C., Dasta, J. E., Davidson, J. E., Devlin, J. W., Kress, J. P., Joffe, A. M., Coursin, D. B., Herr, D. L., Tung, A., Robinson, B. R. H, Fontaine, D. K., Ramsay, M. A., Riker, R. R., Sessler, C. N., Pun, B., ... Jaeschke, R. (2013). Clinical practice guidelines for the management of pain, agitation, and delirium in adult patients in the intensive care unit. *Critical Care Medicine*, *41*(1), 263–306. https://doi: 10.1097/CCM.0b013e3182783b72
- Burry, L., Hutton, B., Williamson, D. R., Mehta, S., Adhikari, N., Cheng, W., Ely, E. W., Egerod, I., Fergusson, D. A., & Rose, L. (2019). Pharmacological interventions for the treatment of delirium in critically ill adults. *Cochrane Database of Systematic Reviews*, (9), 1–119. https:// doi.org/ 10.1002/14651858.CD011749.pub2.
- Devlin, J. W., Roberts, R. J., Fong, J. J., Skrobik, Y., Riker, R. R., Hill, N. S., Robbins, T., & Garpestad, E. (2010). Efficacy and safety of quetiapine in critically ill patients with delirium: A prospective, multicenter, randomized, double-blind, placebo-controlled pilot study. *Critical Care Medicine*. 38(2), 419–427. https://doi.org/ 10.1097/ CCM.0b013e3181b9e302
- Devlin, J. W., Skrobik, Y., Gélinas, C., Needham, D. M., Slooter, A. J., Pandharipande, P. P., Watson, P. L., Weinhouse, G. L., Nunnally, M. E., Rochwerg, B., Balas, M. C., van den Boogaard, M., Bosma, K. J., Brummel, N. E., Chanques, G., Denehy, L., Drouot, X., Fraser, G. L., Harris, J. E, ... Alhazzani, W. (2018). Clinical practice guidelines for the prevention and management of pain, agitation/sedation, delirium, immobility, and sleep disruption in adult patients in the ICU. *Critical Care Medicine*, 46(9), e825–e873. https://doi.org/10.1097/ CCM.000000000003299
- El Hussein, M., & Hirst, S. (2016). Chasing the mirage: A grounded theory of the clinical reasoning processes that Registered Nurses use to recognize delirium. *Journal of Advanced Nursing*, 72(2), 373–381. https:// doi.org/10.1111/jan.12837
- El Hussein, M., & Hirst, S. (2015). Institutionalizing clinical reasoning: A grounded theory of the clinical reasoning processes RNs use to recognize delirium. *Journal of Gerontological Nursing*, *41*(10), 38–44. https://doi.org/10.3928/00989134-20150728-12
- El Hussein, M. T., Rankin, J. A., & Then, K. L. (2018). Mnemonic to assist in management of liver cirrhosis. *The Journal for Nurse Practitioners*, 14(10), 732–738. https://doi.org/10.1016/j. nurpra.2018.08.032

Conclusion

In this manuscript, we provided an overview of the medications used to manage delirium symptoms in the CICU. We used the ABCD mnemonic to highlight current evidence and recommendations related to antipsychotics, benzodiazepines, cholinesterase inhibitors, and dexmedetomidine to manage delirium in the CICU. We shed light on the significance of the CICU nurses' role in implementing strategies to reduce the incidence of delirium in their patients. The identification of pharmacological interventions to prevent or reduce delirium must continue to be a high priority in delirium research.

- El Hussein, M., Markus, S., & Piedrahita, S. (2020). Think first to treat dilutional hyponatremia in patients with heart failure. *The Journal for Nurse Practitioners*, *16*(9), 666–672. https://doi.org/10.1016/j. nurpra.2020.06.029
- El Hussein, M. T., Hirst, S., & Stares, R. (2021). Delirium in emergency departments: Is it recognized? *Journal of Emergency Nursing*. https:// doi.org/10.1016/j.jen.2021.01.009
- Funk, M. C., Beach, S. R., Bostwick, J. R., Celano, C. M., Hasnain, M., Pandurangi, A., Khandai, A. C., Taylor, A., Levenson, J. L, Riba, M., & Kovacs, R. J. (2020). QTc prolongation and psychotropic medications. *The American Journal of Psychiatry*, 177(3), 273–274. https:// doi.org/10.1176/appi.ajp.2019.1760501
- Hui, D., Frisbee-Hume, S., Wilson, A., Dibaj, S. S., Nguyen, T., De La Cruz, M., Walker, P., Zhukovsky, D. S., Delgado-Guay, M., Vidal, M., Epner, D., Reddy, A., Tanco, K., Williams, J., Hall, S., Liu, D., Hess, K., Amin, S., Breitbart, W., ... Bruera, E. (2017). Effect of lorazepam with Haloperidol vs Haloperidol alone on agitated delirium in patients with advanced cancer receiving palliative care: A randomized clinical trial. *Journal of the American Medical Association*, 318(11), 1047–1056. https://doi.org/10.1001/jama.2017.11468
- Ibrahim, K., McCarthy, C. P., McCarthy, K. J., Brown, C. H., Needham, D. M., Januzzi, J. L., Jr., & McEvoy, J. W. (2018). Delirium in the cardiac intensive care unit. *Journal of the American Heart Association*, 7(4), e008568. https://doi.org/10.1161/JAHA.118.008568
- Im, D., Inoue, A., Fujiwara, T., Nakane, T., Yamanaka, Y., Uemura, T., Mori, C., Shiimura, Y., Kimura, K. T., Asada, H., Nomura, N., Tanaka, T., Yamashita, A., Nango, E., Tono, K., Kadji, F. M. N., Aoki, J., Iwata, S., & Shimamura, T. (2020). Structure of the dopamine D 2 receptor in complex with the antipsychotic drug spiperone. *Nature Communications*, 11(1), 1–11. https://doi.org/10.1038/ s41467-020-20221-0
- Kameg, B., & Champion, C. (2021). Atypical antipsychotics: Managing adverse effects. *Perspectives in Psychiatric Care*. 1–5. https://doi. org/10.1111/ppc.12837
- Liu, X., Xie, G., Zhang, K., Song, S., Song, F., Jin, Y., & Fang, X. (2017). Dexmedetomidine vs propofol sedation reduces delirium in patients after cardiac surgery: A meta-analysis with trial sequential analysis of randomized controlled trials. *Journal of Critical Care*, 38, 190–196. https://doi.org/10.1016/j.jcrc.2016.10.026
- Malone, K., & Hancox, J. C. (2020). QT interval prolongation and torsades de pointes with donepezil, rivastigmine and galantamine. *Therapeutic Advances in Drug Safety*, 11, 1–14. https://doi. org/10.1177/2042098620942416
- Mangan, K. C., McKinzie, B. P., Deloney, L. P., Leon, S. M., & Eriksson, E. A. (2018). Evaluating the risk profile of quetiapine in treating delirium in the intensive care adult population: A retrospective review. *Journal of Critical Care*, 47, 169–172. https://doi.org/10.1016/j. jcrc.2018.07.005

- Martin, E., Ramsay, G., Mantz, J., & Sum-Ping, S. J. (2003). The role of the α2-adrenoceptor agonist dexmedetomidine in postsurgical sedation in the intensive care unit. *Journal of Intensive Care Medicine*, 18(1), 29–41.
- Naksuk, N., Thongprayoon, C., Park, J. Y., Sharma, S., Gaba, P., Rosenbaum, A. N., Peeraphatdit, T., Hu, T. Y., Bell, M. R., Herasevich, V., Brady, P. A., Kapa, S., & Asirvatham, S. J. (2017). Editor's choice-clinical impact of delirium and antipsychotic therapy: 10-Year experience from a referral coronary care unit. *European Heart Journal: Acute Cardiovascular Care*, 6(6), 560–568. https://doi.org/10.1177/2048872615592232
- Pauley, E., Lishmanov, A., Schumann, S., Gala, G. J., van Diepen, S., & Katz, J. N. (2015). Delirium is a robust predictor of morbidity and mortality among critically ill patients treated in the cardiac intensive care unit. *American Heart Journal*, 170(1), 79–86. https://doi.org/10.1016/j. ahj.2015.04.013
- Riker, R. R., Shehabi, Y., Bokesch, P. M., Ceraso, D., Wisemandle, W., Koura, F., Whitten, P., Margolis, B. D., Byrne, D. W., Ely, E. W., & Rocha, M. G. (2009). Dexmedetomidine vs midazolam for sedation of critically ill patients: A randomized trial. *Journal of the American Medical Association*, 301(5), 489–499. https://doi:10.1001/ jama.2009.56
- Rivasi, G., Kenny, R. A., Ungar, A., & Romero-Ortuno, R. (2020). Effects of benzodiazepines on orthostatic blood pressure in older people. *European Journal of Internal Medicine*, 72, 73–78. https://doi. org/10.1016/j.ejim.2019.10.032
- Simeone, S., Pucciarelli, G., Perrone, M., Teresa, R., Gargiulo, G., Guillari, A., Castellano, G., Tommaso, L., & Iannelli, G. (2018). Delirium in ICU patients following cardiac surgery: An observational study. *Journal of Clinical Nursing*, 27(9–10), 1994–2002. https://doi.org/10.1111/jocn.14324

- Skrobik, Y., Duprey, M. S., Hill, N. S., & Devlin, J. W. (2018). Low-dose nocturnal dexmedetomidine prevents ICU delirium. A randomized, placebo-controlled trial. *American Journal of Respiratory and Critical Care Medicine*, 197(9), 1147–1156. https://doi.org/10.1164/ rccm.201710-1995OC
- Tampi, R. R., Tampi, D. J., & Ghori, A. K. (2016). Acetylcholinesterase inhibitors for delirium in older adults. American Journal of Alzheimer's Disease & Other Dementias, 31(4), 305–310. https://doi. org/10.1177/1533317515619034
- Turan, A., Duncan, A., Leung, S., Karimi, N., Fang, J., Mao, G., Hargrave, J., Gillinov, M., Trombetta, C., Ayad, S., Hassan, M., Feider, A., Howard-Quijano, K., Ruetzler, K., & Sessler, D. (2020). Dexmedetomidine for reduction of atrial fibrillation and delirium after cardiac surgery (DECADE): A randomised placebo-controlled trial. *The Lancet*, 396(10245), 177–185. https://doi.org/10.1016/ S0140-6736(20)30631-0
- Ungarian, J., Rankin, J. A., & Then, K. L. (2019). Delirium in the intensive care unit: Is dexmedetomidine effective? *Critical Care Nurse*, 39(4), e8–e21. https://10.4037/ccn2019591
- van Eijk, M. M., Roes, K. C., Honing, M. L., Kuiper, M. A., Karakus, A., van der Jagt, M., Spronk, P. E., van Gool, W. A., van der Mast, R. C., Kesecioglu, J., & Slooter, A. J. (2010). Effect of rivastigmine as an adjunct to usual care with haloperidol on duration of delirium and mortality in critically ill patients: A multicentre, double-blind, placebo-controlled randomised trial. *The Lancet*, 376(9755), 1829–1837. https:// doi.org/10.1016/S0140- 6736(10)61855-7
- Yu, A., Wu, S., Zhang, Z., Dening, T., Zhao, S., Pinner, G., & Yang, D. (2018). Cholinesterase inhibitors for the treatment of delirium in non-ICU settings. *Cochrane Database of Systematic Reviews*. 1–32. https:// doi.org/10.1002/14651858.CD012494.pub2.

The Impact of Nurse Practitioners on Health Outcomes in Outpatient Heart Failure Management: A Systematic Review

Payal Fichadiya, ACNP, MN, BSc¹, Karen L. Then, CCN(C), ACNP, PhD^{1*}, James A. Rankin, ACNP, PhD¹

¹University of Calgary Faculty of Nursing

* Corresponding address: University of Calgary Faculty of Nursing, 2500 University Drive N.W., Calgary, AB T2N 1N4

Phone: (403) 220-4640; Email: kthen@ucalgary.ca

Abstract

Background: Heart failure (HF) is a chronic condition, often requiring frequent hospital readmissions. HF management places an immense cost burden on the healthcare system.

Purpose: Our aim was to perform a systematic review of the existing evidence related to the role and effectiveness of nurse practitioner (NP)-led HF management on the outcomes of care for adult outpatients.

Methods: The Cumulative Index of Nursing and Allied Health Literature (CINAHL) and PubMed databases were systematically searched for relevant studies.

Results: Of the 805 articles reviewed, five met the inclusion criteria. The most frequently identified NP roles in HF management included assessment and monitoring of symptoms, medication titration, and patient education. Nurse practitioner-led HF care significantly reduced 30-day readmissions.

Conclusion: Our review findings suggest that NP-led outpatient HF management should be considered as an alternative model of care to improve patient outcomes and decrease healthcare cost.

Key words: nurse practitioner, heart failure management, outpatient, clinical intervention, outcomes of care, systematic review

Fichadiya, P., Then, K. L., & Rankin, J. A. (2021). The Impact of Nurse Practitioners on Health Outcomes in Outpatient Heart Failure Management: A Systematic Review. *Canadian Journal of Cardiovascular Nursing*, 31(2), 20–27.

Key Highlights

- There is limited evidence on the outcomes of NP-led care in outpatient-based specialty HF clinics
- Results suggest that NP-led outpatient HF management may reduce 30-day readmissions and healthcare costs, and improve patient QOL outcomes
- The NP role in outpatient HF management is particularly beneficial, as it facilitates ongoing, comprehensive assessment and monitoring of symptoms, as well as patient education and self-management promotion, and optimizing treatment plans

Introduction

Heart failure (HF) is the leading cause of cardiovascular morbidity and mortality, and use of healthcare resources in Canada (Virani et al., 2017). With 30-day readmission rates of 20%, the management of HF exacerbations costs the Canadian healthcare system \$2.8 billion dollars annually (Heart & Stroke Foundation, 2017). The burden of HF on the healthcare system has prompted the identification of strategies to reduce healthcare costs, without compromising patient outcomes, access to health services, and the delivery of quality patient care (Advisory Panel on Healthcare Innovation [APHI], 2015; Canadian Nurses Association [CNA], 2016). The development of advanced practice nursing (APN) models, such as nurse practitioners (NPs), provides an alternative to the traditional physician-led model (CNA, 2016; Worster et al., 2005) that is cost-effective and preserves high-quality patient care (APHI, 2015; CNA, 2016). While the value-added of NPs has been established in inpatient acute care services, such as cardiac surgery and community primary care, the value proposition of NPs in the outpatient management of HF patients in Canada has yet to be elucidated.

Background & Aim

The integration of NPs into the healthcare system has been associated with several quality improvement indices. In primary care, a systematic review of seven randomised control trials (RCTs), found that NP-led primary care resulted in equal or improved outcomes in several measures, including the ability to achieve effective physiologic control (i.e., blood pressure, glucose, and cholesterol), patient satisfaction, and healthcare resource utilization, compared to physician-led care (Swan et al., 2015). In fact, NPs were found to spend more time with patients during consultation, and patient education was more thorough without increased cost of care (Swan et al., 2015). Although a meta-analysis was not conducted, the results suggest that NPs are able to proficiently perform a number of tasks and skills traditionally carried out by physicians at a reduced cost to the healthcare system. Similar benefits of integrating NPs in the acute care setting, notably decreased average hospital length of stay, reduced cost per visit, and improved patient satisfaction have also been reported (Collins et al., 2014).

While there is increasing evidence on the benefits of NPs in primary care and acute care, there is limited evidence on the outcomes of NP-led care in community and hospital-based specialty clinics, specifically in the management of HF patients. As NPs continue to work and manage HF patients in clinics, it is essential to investigate and document the impact of NP care on patient outcomes. Ongoing analysis is also important as expansion of NP-led clinics may be a viable option to meet the increasing demands of the HF population on an already strained healthcare system. This systematic

Figure 1.

PRISMA article flow diagram

review seeks to appraise the existing literature related to the role and effectiveness of NP-led outpatient management of HF patients.

Methods

Literature Search

As per Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRIMSA) guidelines, a literature search of quantitative studies was conducted on the Cumulative Index of Nursing and Allied Health Literature (CINAHL) and PubMed databases using the terms: nurse practitioner, adult nurse practitioner, advanced practice nurse, and HF clinic, heart function clinic, managed care programs, or disease management programs. The original search yielded a total of 805 articles. An additional five studies were found via an independent review of reference lists (see Figure 1). Based on an initial screening, 738 articles were eliminated.



Ultimately, five studies were included based on the following inclusion and exclusion criteria: Included: 1) quantitative studies, 2) published in English, 3) peer-reviewed articles, 4) utilized an NP-led HF management program (either as independent practitioner or a member of the interprofessional healthcare team), and 5) evaluated the outcomes of the program; Excluded: 1) intervention was led by someone other than an NP, 2) was a letter, commentary, or published abstract, and, 3) reviews and qualitative studies. The timeframe of the search was not restricted, as there is limited literature on the topic. Of note, Benatar et al. (2003) utilized an APN-led, not an NP-led intervention. However, this study was included, as the APN was responsible for medication titration, a role normally within the scope of an NP.

Data Extraction

Data extraction was completed by the lead author (PF). Extracted data included: author, year, country, publication status, sample size, number of patients in each group, inclusion criteria, type of intervention, length of enrolment and follow-up, study aims, NP role, and associated outcomes of care (see Table 1). Identified patient outcomes included 30-day readmission for HF, all-cause mortality, length of stay, quality of life (QOL), and healthcare costs. Additionally, each study was evaluated for the responsibilities of the NPs during the intervention to identify what role they had in HF management.

Results

Study Characteristics

Of the five studies included in this systematic review, four were from the United States and one was from Australia. No Canadian studies were identified. Two studies were RCTs (Benatar et al., 2003; Blum & Gottlieb, 2014); one was a case-control trial (Smith et al., 2016); one was a quasi-experimental study (Lowery et al., 2012); and one was an economic evaluation (Craswell et al., 2018). Sample sizes varied from

| Table 1. Summary of data abstracted from included studies ($N = 5$) on NP-led HF management versus usual care | | | | | |
|--|--|---|---|---|---|
| Author/ Year/ Location | Study Type/ Intervention | Study Purpose | Sample | Inclusion criteria/ Study duration/ length of follow-up | Outcomes |
| Benatar et al., 2003, USA | RCT Outpatient, home- visit by nurse, tele-management by NP | Reduce HF readmissions, length of stay, anxiety, & depression improve self- efficacy & quality of life APN, n = 108 | N = 216 Nurse, n = 108 | HF hospitalization between 1997-2000 12 months 3 months | Reduction in 3-month readmission rate (APN led m = 13, Nurse-led m = 24, p < .001) Shorter lengths of stay (APN led M = 49.5 days, Nurse-led M = 105.0 days, p < .001) QOL scores improved pre-intervention compared to post-intervention in both groups (APN led M = 16.65 to 20.93, p < .01) and (Nurse-led M= 15.06 to 18.34, p < .01). No differences between groups on post intervention scores, p = .63) |
| Blum & Gottlieb, 2014, USA | RCT Outpatient, Telemonitoring | Reduce hospital & emergency room visits Improve self-care | N= 206 NP, n = 104 UC, n=102 | Hospitalization in last year Four years Five years (or until death) | Reduction in 30-day readmission rate of HF in first year QOL scores improved in both groups |
| Craswell et al., 2018, Australia | Results compared to before an NP, MD-led Outpatient NP-led clinic | Cost effectiveness of NP-led HF service | N=214 NP, n = 139 UC, n = 75 | Hospitalization in last year 12 weeks 2 weeks | Cost per NP HF patient \$123 less than UC Cost per visit \$164 less Average follow-up time 2 weeks for NP-led group, 4.9 weeks for UC |
| Lowery et al., 2012, USA | Prospective, quasi experimental Outpatient HF Clinic, NP-led | Reduce all-cause mortality Reduce 30-day readmissions Improved titration of HF medication | N = 967 NP, n = 457 UC, n = 510 | HF admission in last year 2 years 1 year | Reduced all-cause mortality in NP-led at one-year and two-years Reduction in 30-day readmission rates after one-year |
| Smith et al., 2016, USA | Case control study Home visits by NP in 24-72 hours of discharge | Reduced 30-day readmission Reduced acute care return rate (ER, other admission) | N= 672 NP, n = 532 UC, n =140 | LACE score 11-15 (high risk of readmission) One-time visit | Reduction in 30-day readmission rates compared to usual care Reduction in acute care return rate |

206 to 967 patients. Only one study did not have equal samples between groups (NP-led, n = 532; usual care, n = 140; Smith et al., 2016). Heart failure management programs included clinics, telemonitoring and remote follow-up, and home visits. Length of follow-up varied between studies from a single follow-up visit after discharge, to five-year follow-up. Nurse practitioner-led interventions included telemonitoring of symptoms and remote changes to the treatment plan, telephone follow-up, home visitation, and follow-up within a clinic setting. Commonly reported outcomes included 30-day readmission for HF, QOL, and health care costs.

Outcomes of NP-Led Care

30-Day Readmission

Four of the five studies assessed the effect of NP-led care on 30-day readmission rates for HF (Benatar et al., 2003; Blum & Gottlieb, 2014; Lowery et al., 2012; Smith et al., 2016; see Table 2). In Benatar et al.'s study (2003), home nurse-led visitation (HNV, n = 108) was compared to APNled tele-health management (NTM, n = 108). There was no significant difference in characteristics of the HNV and APN telemonitoring groups; however, nurse-led home visits were significantly less effective than APN-led tele management in reducing 30-day readmissions (24 versus 13 total admissions, respectively; p < .00; Benatar et al., 2003). Benatar et al. concluded that the expanded APN role, which included monitoring trans-telephonic alarms and adjusting medication therapy, was more effective than nurse-led home care, as this enabled patients to maintain an optimally compensated state.

Similarly, Blum and Gottlieb (2014) examined whether randomly assigned home telemonitoring by an NP (n = 104) improved 30-day readmission rates, healthcare costs, and QOL scores, compared to usual physician-led care (n = 102) in patients over a follow-up period of five years. Although this study showed a significant reduction in 30-day readmission rates in the NP-led telemonitoring group (30%) compared to usual care (43%, p < .05) in the first year, this difference did not persist after the first year. Moreover, total costs, hospitalizations, patient symptoms, and mortality did not improve significantly in the NP telemonitoring compared to the usual care group. Based on their findings, Blum and Gotlieb questioned the role of telemonitoring in the care of HF patients.

In a quasi-experimental study, Lowery et al. (2012) hypothesized that NP-led HF management (n = 457) compared with usual physician managed care (n = 510) would improve the health outcomes of patients at one and two

Table 2. Benefits of NP-led HF Management

- Reduced 30-day readmission rates
- · Reduced all-cause mortality
- Emphasis on patient education and health promotion
- Reduced wait times for appointments
- Reduced healthcare costs per visit
- · Improved health-related quality of life

years, as measured by HF readmissions and mortality. Lowery et al. (2012) showed that all-cause mortality was 17.7% in the first year and 27.6% in the second year for patient's receiving usual care. Comparably, patients receiving NP-led care had a significantly reduced all-cause mortality of 7.8% (p < .001) in the first year and 14.5% (p < .001) in the second year. However, differences in HF readmission rates were only significantly reduced with NP-led care after one year compared to usual care (p < .001); no significant differences were noted after two years.

Lastly, Smith et al. (2016) conducted a case-control study with HF patients, specifically exploring the effects of an NP-led home visit targeted intervention for high-risk of readmission patients (n = 532) versus controls (n = 144). The single NP home visit, completed within 48 to 72 hours of discharge, included a focused clinical assessment, medication reconciliation, patient education on medication compliance and symptom recognition, and adjustments to the clinical care plan, as required. Smith et al. found that 30-day readmission rates were significantly lower in patients who received a home visit by an NP (12.2%) relative to controls (23.6%; p = .0006). A limitation of their study, however, is the patients in the intervention group were significantly younger than in the control group (M = 70.7 versus 75.4 respectively, p = .0004).

Healthcare Costs

Two studies included in our review conducted healthcare cost analyses between NP-led care and physician-led care (Blum & Gottlieb, 2014; Craswell et al., 2018). Blum and Gottlieb (2014) identified no significant differences in Medicare costs between the usual care (M= \$11,053, SD = \$14,131) and NP-led telemonitoring group (M = 13,136, SD= \$17,430, p-value not reported). According to Blum and Gottleib, these non-significant results may be explained by lack of reduction in all-cause readmissions in the NP-led telemonitoring group.

Craswell et al. (2018) conducted a retrospective cost-comparison of NP-led HF service data versus data from the medical-led service (i.e., usual care) before the NP model of care was introduced for HF patients following hospital discharge in Australia. Importantly, while patients in the NP model of care (n = 139) saw the NP every two weeks on average and achieved optimum medication titration between 6 to 12 weeks, usual care patients (n = 75) attended the medical clinic every 3 to 8 weeks and took up to six months to reach therapeutic levels and target dosage of their prescribed cardiac medications. Moreover, when assessing total costs per patient, NP-led HF service cost was \$123 less than that of a patient attending usual care and the cost per visit was \$164 less (Craswell et al., 2018).

Health-Related Quality of Life

Two studies in our review reported QOL scores (Benatar et al., 2003; Blum & Gottlieb, 2014). Benatar et al. (2003) report improvements in QOL scores post-intervention within both home nurse visitation (M = 15.06 to 18.34, p <.01) and NP telemonitoring groups (M = 16.65 to 20.93.34, p <.01) on four QOL questionnaires (Minnesota Living with Heart Failure Questionnaire, Index-Cardiac Version 4, Heart failure Self-Efficacy, and Hospital Anxiety and Depression Score). No statistical differences in QOL scores were noted between groups post intervention (Benatar et al., 2003). Similarly, Blum and Gottlieb (2014) reported a significant increase in QOL scores over the year of the study in both the usual care and NP-led telemonitoring groups (p < .001), but differences between the cohorts were non-significant.

Role of the NP in Outpatient HF Management

The roles of NPs were similar in all studies reviewed. Nurse practitioners were responsible for the assessment and monitoring of HF patients' symptoms and their medication management (Benatar et al., 2003; Blum & Gottlieb, 2014; Craswell et al., 2018; Lowery et al., 2012; Smith et al., 2016). Most NP roles included the provision of patient education and the promotion of self-management by advocating for daily weight charting, medication compliance, low-salt diet, daily exercise, smoking cessation, and abstaining from alcohol (Benatar et al., 2003; Lowery et al., 2012; Smith et al., 2016). In two of the studies reviewed, NPs also clarified and optimized treatment plans and consulted with other healthcare professions (Lowery et al., 2012; Smith et al., 2016).

Discussion

This systematic review sought to appraise the existing literature related to the effectiveness and role of NP-led outpatient management of HF patients. Effectiveness was assessed based on several key outcome measures, including 30-day readmissions, healthcare costs, and QOL scores. Four of the studies demonstrated that NP-led care resulted in a reduction in 30-day readmission rates compared to usual HF care (Benatar et al., 2003; Blum & Gottlieb, 2014; Lowery et al., 2012; Smith et al., 2016). In studies that followed patients for a number of years, this effect was only seen for a maximum of one year (Blum & Gottlieb, 2014; Lowery et al., 2012). These findings are consistent with previous reports (Thompson & Dykeman, 2007). Based on a 2007 systematic review of five studies published between 1983 and 2003 on the outcomes of NP-led community HF clinics compared to physician-led HF clinics or usual primary physician care, Thompson and Dykeman reported a significant decrease in the number of hospital readmissions (p < .05), and improved patient functional status (p < .018) and overall QOL (p < .01), with NP or APN HF management. These positive outcomes of NP-led care were attributed to increased emphasis on patient education, easier access to healthcare services, and better utilization of healthcare resources (Thompson & Dykeman, 2007).

In terms of healthcare costs, our assessment of the literature does not clearly demonstrate cost savings or equivalency between usual medical versus NP-led care. Similar to the findings of this review, previous studies have also cited mixed results. In a salary-based, economic evaluation of NP-led versus physician care, Dieriek-van Daele et al. (2010) found that NP-led care was significantly less expensive. However, Venning et al. (2000) found that while NP-led care was less expensive for laboratory services, there were no differences in monthly medication costs, which was likely attributable to the pre-set cost by the pharmaceutical companies and their distributors.

The variance in economic evaluations of the NP role may also be a result of the data used to calculate cost (e.g., salaries, medications, supplies, facility costs, etc.). A review by Lopatina et al. (2017) examined whether current guidelines for economic evaluation are appropriate for evaluations of NP and clinical nurse specialist (CNS) roles. They reported that establishing an economic benefit is a challenge as the implementation of an NP role varies across countries due to the unique social, political, and economic contexts of healthcare polices, as well as funding arrangements that influence role enactment (Lopatina et al., 2017). Moreover, to date, the Canadian context has not been explored. Additionally, these roles are highly dependent on individual attributes of the NP or CNS, organizational and practice settings, and characteristics of the patient population (Lopatina et al., 2017). Collectively, all of these variables make it difficult to determine the cost-effectiveness of NP-led care.

Based on two studies in our review, there was a significant improvement within the NP-led group pre-and post-QOL scores. However, akin to the findings reported by others, this effect was lost in the between group analysis (i.e., NP-led versus other healthcare professionals; Newhouse et al., 2011; Sangster-Gormley et al., 2015; Smigorowsky et al., 2020). These findings may be explained by the connections with patients that developed in both groups, not only by collecting data, but also by attending to their healthcare needs, inquiring about their well-being, and providing encouragement and information throughout the course of study (Newhouse et al., 2011; Sangster-Gormley et al., 2015). This evidence also suggests that healthcare professionals' involvement, regardless of their speciality (e.g., nursing, medicine, research nurse, etc.) has the capacity to improve QOL for patients simply by increasing contact and communication (Blum & Gottlieb, 2014).

The roles of the NP identified in the five studies reviewed are consistent with the roles described by others (Thompson & Dykeman, 2007). Nurse practitioners' ability to assess and monitor patient status and progression of HF symptoms is essential, as thorough assessment skills are required for early recognition of clinical deterioration and to guide medication titration and treatment plan changes (Kilpatrick et al., 2010; Worster et al., 2005). Early symptom recognition and intervention has been described as a key tenet of preventing exacerbations and the ultimate need for hospitalization (Kleinpell et al., 2019).

Our review also highlights the unique NP roles of HF patient education and self-management promotion. Evidence suggests that poor adherence to self-care behaviours is associated with higher hospital readmissions, increased mortality rates, and frequent emergency department visits in HF patients (Benatar et al., 2003, Lowery et al., 2012; Smith et al., 2016; Virani et al., 2017). Therefore, securing strategies and personnel, such as NPs, who focus on self-care promotion is central to improving health outcomes (Al-Sutari & Ahmad, 2017). Finally, patient education is not only an important NP role, but also a component of care that patients highly value. In a recent cross-sectional study investigating the outcomes of NP-led care on patient satisfaction on a cardiology service, O'Toole et al. (2019) found that the patients surveyed (N = 117) were most satisfied by NPs' use of simple language, ability to listen closely to their concerns, and sufficient time per appointment for providing information and answering questions.

Our review also identified that NPs play an important role in clarifying and optimizing treatment plans and consulting with other healthcare professionals (Lowery et al., 2012; Smith et al., 2016). This not only requires an understanding of the patient's illness, but also recognition of changes in status and, ultimately, the ability to effectively communicate patient concerns. In a Canadian observational study, Kilpatrick (2013) found that NPs were pivotal members in effective team communication and decision making; they initiated half of the overall interactions within the team, to both ask for clarification and to provide professional opinions on patient care. Similarly, NPs offer continuity to the multidisciplinary team, as well as to patient care. In a recent study, Austin et al. (2020) reported improvement in the patient explanations category of the Hospital Consumer Assessment of Health Care Providers and Systems (from 56 to 86%) and 29% improvement in interprofessional collaboration following the addition of an NP to the healthcare team on a medical-surgical unit. These findings suggest that NPs can make a positive difference in supporting the healthcare team, as well as patient satisfaction.

Lastly, NPs use a variety of strategies to effectively assess and manage HF patients. Telemonitoring, telephone follow-ups, and home visits were utilized in the studies reviewed, which reinforces that HF management can occur through diverse modalities beyond the traditional clinic setting. These methods increase access for patients who may not be able to attend a clinic and decrease follow-up wait times (Craswell et al., 2018). In fact, such diverse methods of remote healthcare delivery have become especially critical during the current COVID-19 pandemic. Minimizing contact and maintaining social distancing without compromising access to follow-up and treatment has become instrumental in limiting the spread of this virus.

While the studies reviewed demonstrated a favourable reduction in 30-day readmission rates, decreased healthcare

costs, and improved quality-of-life score, they were not without limitations. A lack of randomization of participants was a limitation in three of the studies under review. Benatar et al. (2003) had more participants on angiotensin converting enzyme inhibitors and Beta-blocker medication in the treatment group compared to the control group. Two studies had younger participants in the intervention group compared to the control (Lowery et al. 2012, Smith et al. 2016), while one study had patients with more comorbidities in the control group (Lowery et al., 2012). These factors may confound the results of these studies and make it difficult to know if they are a true reflection of the intervention or a result of underlying differences between the groups.

Limitations

Limitations of this systematic review include the small body of published research on assessment of NP-led HF management in the outpatient setting. Moreover, most of these studies were conducted more than five years ago. All of the reviewed work was also conducted outside of Canada in different healthcare systems. However, these studies demonstrate fairly consistent findings over time and across international boundaries. They also provide a foundation Canadian studies could build upon to better elucidate the role and effectiveness of NPs in our healthcare system.

Implications for Practice & Research

Clinically, NPs offer important benefits in the outpatient management of HF. The value of their unique, holistic approach to care is evident at the level of the patient, the healthcare team, and the healthcare system (CNA, 2019; Figueira, 2003). At the patient level, their role in diagnostics and medical management is augmented by the provision of patient education, as well as self-management and health promotion strategies (CNA, 2019). At the healthcare team level, NPs collaborate and coordinate with other healthcare providers to address the complex needs of the patient population (CNA, 2019). By clarifying and optimizing treatment plans and maintaining clear communication, NPs facilitate continuity of care (CNA, 2019).

Nurse practitioners contribute to the healthcare system by drawing upon their nursing experience and advanced skills to provide cost-effective, quality healthcare. Their management strategies lead to improved health outcomes, such as reduced 30-day readmission rates and improved patient QOL scores. They also engage in innovative strategies for improving client care, as demonstrated by the various modes of healthcare delivery in this review. Patient advocacy, decision making about management plans, and mentorship roles define their contribution as leaders within the healthcare system (CNA, 2019). Thus, with their unique knowledge and skills, NPs are in an ideal position to provide safe, comprehensive, evidence-informed HF patient centred care. Future research efforts should focus on more robust studies in NP-led outpatient HF management. More rigorous randomized control trials, with larger samples and multi-centre sites would contribute to the existing body of evidence. Canadian research in the area of NP-led HF management would facilitate comparisons with other countries regarding NP roles, responsibilities, and outcomes of NP-led care in our healthcare system. More robust economic and QOL research that includes both quantitative and qualitative perspectives would also add to our understanding of benefits of NPs in HF management. Lastly, future studies should also examine the role of NPs in preventative care, that is targeting patients in early stages of HF and following patients to track how early intervention by NPs may influence health outcomes and progression of disease.

Conclusion

Our appraisal of the existing literature related to the effectiveness and role of NP-led outpatient management of HF patients supports the value-added of NPs in this setting. The

REFERENCES

- Advisory Panel on Healthcare Innovation (APHI). (2015). Unleashing innovation: Excellent healthcare for Canada. Ottawa, ON. Retrieved from https://www.canada.ca/en/health-canada/services/publications/ health-system-services/report-advisory-panel-healthcareinnovation.html
- Al-Sutari, M. M., & Ahmad, M. M. (2017). Effect of educational program on self-care behaviors and health outcome among patients with heart failure: an experimental study. International journal of evidence-based healthcare, 15(4), 178–185. https://doi.org/10.1097/ XEB.000000000000108
- Austin, S., Powers, K., Florea, S., & Gaston, T. (2020). Evaluation of a nurse practitioner-led project to improve communication and collaboration in the acute care setting. *Journal of the American Association of Nurse Practitioners*. Online ahead of print. https://doi.org/10.1097/ JXX.000000000000402
- Benatar, D., Bondmass, M., Ghitelman, J., & Avitall, B. (2003). Outcomes of chronic heart failure. Archives of Internal Medicine, 163(3), 347–352. https://doi.org/10.1001/archinte.163.3.347
- Blum, K., & Gottlieb, S. S. (2014). The effect of a randomized trial of home telemonitoring on medical costs, 30-day readmissions, mortality and health-related quality of life in a cohort of community-dwelling heart failure patients. *Journal of Cardiac Failure*, 20(7), 513–521. https:// doi.org/10.1016/j.cardfail.2014.04.016
- Canadian Nurses Association. (2019). Advanced practice nursing a pan-Canadian framework. Ottawa, ON. https://www.cna-aiic.ca/-/media/ cna/page-content/pdf-en/apn-a-pan-canadian-framework.pdf
- Canadian Nurses Association. (2016). The nurse practitioner position statement. Ottawa, ON. https://www.cna-aiic.ca/-/media/ cna/page-content/pdf-en/the-nurse-practitioner-position-statement_2016.pdf?la=en&hash=B13B5142C8D02990439EF06736E-A284126779BCC
- Collins, N., Miller, R., Kapu, A., Martin, R., Morton, M., Forrester, M., Atkinson, S., Evans, B., & Wilkinson, L. (2014). Outcomes of adding acute care nurse practitioners to a Level I trauma service with the goal of decreased length of stay and improved physician and nursing satisfaction. *The Journal of Trauma and Acute Care Surgery*, *76*(2), 353–357. https://doi.org/10.1097/TA.00000000000097

unique combination of medical skills, nursing knowledge, and autonomous practice regulations make NPs well-positioned to provide a broad scope of clinical services and optimal management of chronic diseases such as HF. Specifically, their attention to assessment and monitoring, efficient medication titration and optimization, and ability to spend more time on patient education and promoting self-management without increasing healthcare costs appear to be key advantages of NP-led care. The research summarized in this systematic review adds to the body of evidence that NPs have the skills and knowledge to provide optimal outpatient HF management, reduce readmission rates and provide quality patient care. Additionally, by prioritizing health promotion, accommodating timely follow-up, and engaging in versatile modes of healthcare delivery, NPs may help to reduce the cost of care burden on the healthcare system over time. It is imperative that administrators, healthcare organizations, and governments look to other options, such as NPs, as a means to not only reduce healthcare costs, but also as a way to enhance quality of care and improve HF patient outcomes.

- Craswell, A., Dwyer, T., Rossi, D., Armstrong, C., & Akbar, D. (2018). Cost-effectiveness of nurse practitioner-led regional titration service for heart failure patients. *The Journal for Nurse Practitioners*, 14(2), 105–111. https://doi.org/10.1016/j.nurpra.2017.11.007
- Dierick-van Daele, A. T., Steuten, L. M., Metsemakers, J. F., Derckx, E. W., Spreeuwenberg, C., & Vrijhoef, H. J. (2010). Economic evaluation of nurse practitioners versus GPs in treating common conditions. *British Journal of General Practice*, 60(570), e28–e35. https://doi.org/10.3399/bjgp10X482077
- Figueira, M. (2003). ACNPs' role in heart failure management. *The Nurse Practitioner*, 28(7), 57–58. https://doi. org/10.1097/00006205-200307000-00021
- Heart & Stroke Foundation. (2017). 2016 report on the health of Canadians: The burden of heart failure. https://www.heartandstroke.ca/-/ media/pdf-files/canada/2017-heart-month/heartandstroke-reportonhealth-2016.ashx?la=en
- Kilpatrick, K. (2013). Understanding acute care nurse practitioner communication and decision-making in healthcare teams. *Journal of Clinical Nursing*, 22(1-2), 168–179. https://doi. org/10.1111/j.1365-2702.2012.04119.x
- Kilpatrick, K., Harbman, P., Carter, N., Martin-Misener, R., Bryant-Lukosius, D., Donald, F., & DiCenso, A. (2010). The acute care nurse practitioner role in Canada. *Nursing Leadership*, 23, 114–139. https:// doi.org/10.12927/cjnl.2010.22272
- Kleinpell, R. M., Grabenkort, W. R., Kapu, A. N., Constantine, R., & Sicoutris, C. (2019). Nurse practitioners and physician assistants in acute and critical care: A concise review of the literature and data 2008–2018. *Critical Care Medicine*, 47(10), 1442–1449. https://doi. org/10.1097/CCM.00000000003925
- Lopatina, E., Donald, F., Dicenso, A., Martin-Misener, R., Kilpatrick, K., Bryant-Lukosius, D., & Marshall, D. (2017). Economic evaluation of nurse practitioner and clinical nurse specialist roles: A methodological review. *International Journal of Nursing Studies*, 72, 71–82. https://doi. org/10.1016/j.ijnurstu.2017.04.012

Fichadiya, P., Then, K. L., & Rankin, J. A.

- Lowery, J., Hopp, F., Subramanian, U., Wiitala, W., Welsh, D., Larkin, A., Stemmer, K., Zak, C., & Vaitkevicius, P. (2012). Evaluation of a nurse practitioner disease management model for chronic heart failure: A multi-site implementation study. *Congestive Heart Failure*, 18(1), 64–71. https://doi.org/10.1111/j.1751-7133.2011.00228.x
- Newhouse, R. P., Stanik-Hutt, J., White, K. M., Johantgen, M., Bass, E. B., Zangaro, G., Wilson, F. F., Fountain, L., Steinwachs, D. M., Heindel, L., & Weiner, J. P. (2011). Advanced practice nurse outcomes 1990-2008: A systematic review. In *Database of Abstracts of Reviews of Effects* (*DARE*): Quality-assessed Reviews [Internet]. Centre for Reviews and Dissemination (UK). https://www.ncbi.nlm.nih.gov/books/ NBK99366/
- O'Toole, J., Ingram, S., Kelly, N., Quirke, M. B., Roberts, A., & O'Brien, F. (2019). Patient satisfaction with innovative nurse practitioner cardiology services. *Journal for Nurse Practitioners*, 15(4), 311–315. https:// doi.org/10.1016/j.nurpra.2018.12.013
- Sangster-Gormley, E., Griffith, J., Schreiber, R., Feddema, A., Boryki, E., & Thompson, J. (2015). Nurse practitioners changing health behaviours: One patient at a time. *Nursing Management*, 22(6). https://doi. org/10.7748/nm.22.6.26.e1404
- Smigorowsky, M. J., Sebastianski, M., Sean McMurtry, M., Tsuyuki, R. T., & Norris, C. M. (2020). Outcomes of nurse practitioner-led care in patients with cardiovascular disease: A systematic review and metaanalysis. *Journal of Advanced Nursing*, 76(1), 81–95. https://doi. org/10.1111/jan.14229

- Smith, J., Pan, D., & Novelli, M. (2016). A nurse practitioner-led intervention to reduce hospital readmissions. *The Journal for Nurse Practitioners*, 12(5), 311-316. https://doi.org/10.1016/j.nurpra.2015.11.020
- Swan, M., Ferguson, S., Chang, A., Larson, E., & Smaldone, A. (2015). Quality of primary care by advanced practice nurses: A systematic review. *International Journal for Quality in Health Care*, 27(5), 396– 404. https://doi.org/10.1093/intqhc/mzv054
- Thompson, T., & Dykeman, M. (2007). Nurse practitioners in Canadian heart failure clinics: Evidence to support their presence on healthcare teams. *Canadian Journal of Nursing Leadership*, 20(2), 81–94. https:// doi.org/10.12927/cjnl.2007.18904
- Venning, P., Durie, A., Roland, M., Roberts, C., & Leese, B. (2000). Randomised controlled trial comparing cost effectiveness of general practitioners and nurse practitioners in primary care. *British Medical Journal*, 320(7241), 1048–1053. https://doi.org/10.1136/ bmj.320.7241.1048
- Virani, S. A., Bains, M., Code, J., Ducharme, A., Harkness, K., Howlett, J. G., Ross, H., Sussex, B., & Zieroth, S. (2017). The need for heart failure advocacy in Canada. *Canadian Journal of Cardiology*, 33(11), 1450–1454. https://doi.org/10.1016/j.cjca.2017.08.024
- Worster, A., Sarco, A., Thrasher, C., Fernandes, C., & Chemeris, E. (2005). Understanding the role of nurse practitioners in Canada. *Canadian Journal of Rural Medicine*, 10(2), 89–94. https://srpc.ca/resources/ Documents/CJRM/vol10n2/pg89.pdf