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## Health Care Initiative to Evaluate the Impact of a Nurse Practitioner Led Community Wound Care Service on Emergency Department Utilization

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A thesis submitted in partial fulfillment of the requirements for the Doctor of Philosophy degree in Health and Rehabilitation Sciences

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## Abstract

Nurse Practitioners (NP) diagnose and treat wounds and wound-related conditions based on their advanced scope of practice. An NP with graduate-level wound care education (NP(W)) gains additional knowledge and clinical experience to provide comprehensive wound care.

This research aimed to explore community patients' access to wound care in Southwestern Ontario (Canada). A quality improvement project was initiated utilizing stakeholder feedback to develop and implement a 12-week pilot NP(W)-Led community-based wound care service; the NP(W) wound care practices, clinical outcomes, and adverse events were described. One hundred twelve participants attended the service over 117 visits. The NP(W) services included prescribing and administering medications, providing treatments, ordering laboratory and diagnostic tests, sending referrals, and consultations.

Patient experience was captured via a mail-in survey of the Generic Short Patient Experiences Questionnaire. There were 49 completed questionnaires from the NP NP(W)-Led service. Respondents reported confidence in the NP(W) skills and satisfaction with the overall care.

Chart audits were conducted on 2066 charts to examine emergency department (ED) utilization before, during, and post-implementation of the NP(W)-Led wound care service. The most common reason for going to the ED was at the ED providers' request, followed by being sent by a community nurse. There was a statistical difference between the total visits and visits for wound care at two points. Results from this small pilot study suggested a high-level patient satisfaction and noted decreased ED visits during the time the clinic was open.

*Keywords:* Nurse practitioner, NP, wounds, wound care, community, emergency department, patient experience, quality improvement project

## Summary for Lay Audience

Nurse Practitioners (NP) have an advanced scope of practice that allows them to determine a diagnosis, provide treatments, order medications, and order laboratory and diagnostic tests. NPs also work with other health care providers and refer patients to specialists. This advanced scope of practice enables NP to diagnose and treat wounds and wound-related conditions and coordinate care in the community. An NP with advanced graduate-level wound care education (NP(W)) has additional knowledge and clinical experience, enabling them to provide comprehensive care.

This doctoral research aimed to explore community patients' access to wound care in an urban centre in Southwestern Ontario (Canada). A quality improvement project was initiated to develop and implement an NP(W)-Led community-based wound care service. Feedback from stakeholders provided information to assist with the development and implementation of a wound care service.

The NP(W)-Led service ran as a 12-week pilot; NP(W) wound care practices, clinical outcomes, and adverse events were described. One hundred twelve participants attended the service over 117 visits. The NP(W) services included prescribing and administering medications, providing treatments, ordering laboratory and diagnostic tests, sending referrals, and consultations. One patient was sent to the emergency department (ED) with a resistant wound infection, and another to receive medication.

Patient experience was captured via a mail-in survey of the Generic Short Patient Experiences Questionnaire. There were 49 completed questionnaires from the NP(W)-Led wound care service. Respondents reported confidence in the NP(W) skills and satisfaction with the overall care. Participants also indicated a short wait to receive care. Experience score was higher in females than males.

Chart audits were conducted on 2066 charts to examine ED use before, during, and post-implementation of the NP(W)-Led wound care service. Fifty-four percent ( $n=1124$ ) of the total visits were wound-related. The most common reason for going to the ED was at the ED

providers' request, followed by being sent by a community nurse. This study provides information to aid with future NP(W) role development.

## Acknowledgments

I want to thank my supervisory committee members, Dr. Pamela Houghton, Dr. Karen Campbell, and Dr. Maher El-Masri, for their help, support, and guidance through this process.

Additionally, I would like to thank Erie St. Clair Local Health Integration Network for providing me with the opportunity to conduct my research. I would also like to thank the staff and pharmacists at Grand Maris Urgent Care. Special thanks to Dr. John Minardi, who made my research possible.

I would also like to thank the staff and faculty at the University of Windsor and in particular, Dr. Jody Ralph, Dr. Natalie Giannotti, Professor Gina Pittman, and Susan Rotondi-Moore for all their endless support and encouragement.

## Dedication

This dissertation is dedicated to my husband, John and my children Melissa, Caleb, and Zach. I value and appreciate them every day. Their love, support, ongoing encouragement, and occasional prodding helped me through this process.

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# Chapter 1

## 1 Thesis Introduction

Health care costs are continually rising in Canada. As such, the utilization of alternative health care delivery models needs consideration. For this to happen, these models need to be innovative, evidence-based, and cost-effective. To be sustainable, the delivery model must align with the mandates established by the Government of Ontario.

The Ministry of Health and Long-Term care (MOHLTC) funds 14 Local Health Integration Networks (LHINs), which provide home, community, and long-term care services for residents of Ontario (Canada). The MOHLTC seeks to improve patient care by increasing access and integrating acute and community care.<sup>1</sup> Additionally, LHINs strive for less reliance on emergency departments (ED) for chronic disease management.<sup>2</sup> Wound care services are an area in which improvements can help reduce the burden on emergency care. As there are gaps and variability in services provided across Ontario.<sup>3</sup>

Restructuring of two hospitals in one urban city in Southwestern Ontario (Canada) is in the initial stages. This restructuring provides an opportunity to examine access to wound care and explore alternate models of care, such as utilizing nurse practitioners (NPs). The lead investigator for this thesis hypothesized that an NP(W)-Led community-based wound care service would provide local LHIN patients with access to timely, evidence-informed wound care, resulting in increased satisfaction with care, and decreased ED visits for wound care in this population.

It is important to note that there are some limitations to the wound care education provided in the Ontario Primary Health Care NP Program (nine university consortium), which is predominately self-directed learning. Theoretical knowledge is provided regarding the assessment and treatment of various wounds. Unfortunately, the clinical application of the knowledge, skills, and judgement required to assess and treat various wound-related conditions depends on clinical placement opportunities and the preceptor's knowledge and comfort in providing wound care. Additional advanced

education in wound care, particularly at a master's level, provides students with essential knowledge and clinical skills which enable NPs to provide comprehensive evidence-informed wound care.

The lead investigator in the studies for this thesis is a Nurse Practitioner–Primary Health Care (NP-PHC) with a Master of Clinical Science-Wound Healing (MCISc-WH). This NP has also worked as an NP-PHC in the ED since 2003. As well, the lead investigator (NP) is currently volunteering on several wound care projects through the local LHIN and is on an NP task force (Vision for Tomorrow) through the Registered Nurses Association of Ontario (RNAO). The task force seeks to optimize the NP role in an integrated healthcare system. Throughout this thesis, the lead investigator with advanced wound care education is referred to as an NP(W) (wound healing).

## 1.1 Study Purpose

This doctoral research aimed to explore community patients' access to wound care in one area of Southwestern Ontario. The three-part study included:

1. developing and implementing an NP(W)-Led community-based wound care service,
2. examining the experience of patients who received wound care through the NP(W)-Led community-based wound care service compared to those who received wound care in the emergency department (ED), and
3. examining the effect of an NP(W)-Led community-based wound care service on ED utilization.

Study approval through the University Research Ethics Board (REB) (REB # 108999). A second university reviewed and accepted the ethics submission (REB# 18-074) (see Appendix A for REB Approvals). The local LHIN and the community clinic provided letters of support (See Appendix B for Agency Support Letters).

## 1.2 Chapter Overview

**Chapter one** introduces the setting, topics under study, and outlines the thesis's division across the seven chapters. **Chapters two and three** are bridging chapters that provide background information for the subsequent manuscript chapters. **Chapter two** provides a narrative literature review providing an overview of nurse practitioners and wound care, and a general overview of the thesis's topics. **Chapter three** discusses a quality improvement project (QIP) undertaken to develop and implement an NP(W)-Led community-based wound care service. The QIP uses a variety of approaches to describe a sequential story. Chapters four, five, and six are manuscripts reflecting the results of the three-part study described above. **Chapter four** explores the NP(W)-Led community-based wound care service. This chapter provided information related to the development of the wound care service. Data analysis provided information to describe the NP(W) practice, clinical outcomes, and report any adverse events. **Chapter five** examined the patient experience for patients who received wound care through the wound program compared to those receiving care in the ED. **Chapter six** consisted of chart reviews to examine ED utilization before, during and after implementing the NP(W)-Led community-based wound care service. Lastly, **Chapter seven** provides an overall discussion of the results produced from the thesis work. Study strengths and limitations are highlighted, along with clinical practice implications and future research opportunities.

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## Chapter 2

### 2 Narrative Literature Review

A narrative literature review was undertaken to identify and summarize published literature on nurse practitioners and wound care. The background will also review topics relevant to this thesis, including wounds, Local Health Integration Network (LHIN), and emergency department (ED).

#### 2.1 Introduction and background

Nurse practitioners (NPs) in Canada provide care across the lifespan in various health care settings, educating patients and their families about health promotion, disease prevention and managing illness. NPs improve access to services, reduce wait times, decrease costs, and reduce hospital admissions and readmissions.<sup>1</sup> Across Canada, the NP's scope of practice varies by province or territory;<sup>2</sup> all provinces and territories have implemented legislation recognizing the role and protected NP title.<sup>1</sup> To become an NP in Canada, a registered nurse (RN) requires additional clinical experience followed by a graduate-level education through an approved NP program. Upon completing the program, candidates must pass the Canadian Nurse Practitioner Examination and apply for registration through a regulatory body in their province/territory.

##### 2.1.1 History of NP Role in Ontario

In 2007, the Ministry of Health and Long-term Care (MOHLTC) introduced a publicly funded model of care by implementing NP-Led Clinics. The NP-Led clinic model was designed to reduce the number of Ontarians without primary care providers and improve the comprehensiveness and integration of services.<sup>3</sup> The first NP-Led clinic was the Sudbury District NP Clinic,<sup>3</sup> which opened in 2007. Currently, there are 25 NP-Led Clinics across Ontario.<sup>4</sup> In 2009, the MOHLTC funded 14 NP-Led LTC Outreach Teams (NLOTs) throughout Ontario. The goal was to provide LTC residents with timely on-site care and to identify if any resident required to transfer to the Emergency Department

(ED).<sup>5</sup> NP-Led LTC outreach teams utilize NPs to assess, diagnose, and treat residents.<sup>6</sup> The programs have resulted in a 43% reduction in transfers of low acuity patients to the ED.<sup>7</sup>

Due to the success of NLOTs, the MOHLTC funded a 3-year pilot in 2017, creating 75 “Attending NP” positions in LTC facilities. Attending NPs became the most responsible provider for the residents in these LTC facilities, a role previously reserved for physicians. Attending NPs were responsible for managing and coordinating the residents’ care through collaboration, consultation, and referral. The project’s goal was to increase access and improve the quality of care by providing LTC residents with screening, assessments, specialist referrals, follow-up care, chronic disease management (which includes wound care), and end-of-life care.<sup>8</sup>

The Canadian Nurses Association (CNA) describes NPs as a valued, cost-effective solution for accessing quality health care.<sup>1</sup> Patients indicate that NPs are readily available<sup>9</sup> and often have shorter wait times than other providers.<sup>3</sup> Additionally, NPs spend sufficient time with the patients, providing a comprehensive exam<sup>3,10,11</sup> that is patient-centred.<sup>9,10</sup> Patients also indicate that NPs provide health care as well as offering emotional and spiritual support.<sup>12</sup>

### 2.1.2 Regulation of the NPs in Ontario

In Ontario, registered nurses in the Extended Class (RN(EC)) can use the designation NP. They must also register with the College of Nurses of Ontario (CNO) under one or more of the following specialty certificates: NP-Primary Health Care (NP-PHC), NP-Pediatrics, and NP-Adult. The CNO sanctions practice standards that reflect the *Regulated Health Professions Act, 1991* (RHPA) and the *Nursing Act, 1991*. The CNO also authorizes controlled acts that allow NPs to practice with an advanced scope; registered nurses (RNs), even those considered advanced practice nurses (APNs), are not authorized to perform controlled acts sanctioned to NPs. There are 4,967 NPs licensed to practice in Canada, with the majority (2,855) licensed in Ontario.<sup>13</sup> NPs practice

independently or collaboratively in various settings across Ontario, including acute, primary, rehabilitative, curative and supportive care, palliative and end-of-life care.<sup>14</sup>

### 2.1.3 International NP role

The role of the NP is recognized globally. NPs practice in the United States, Australia, New Zealand, Hungary, Canada, Republic of Ireland, Israel, and Jamaica.<sup>15-17</sup> Globally, roles vary, but many countries recognize NP as a protected title, requiring graduate-level education, licensure and regulation.<sup>15,18,19</sup> Some countries do not have protected titles, and others have Advanced Practice Nurses (APN) without a regulated NP role.<sup>15</sup> In countries with NPs, they perform advanced health assessments, diagnostic testing, screenings, and prescribe medications.<sup>17</sup> In these countries, NP's role is geared towards prevention, health education, monitoring chronic disease and coordination of care.<sup>17</sup>

The scope of practice for NPs is similar in the United States (US) and Australia. In the US, the scope of practice of NPs is based on the *Nurse Practice Act*. Services vary based on state regulations but may include ordering, performing and interpreting diagnostic tests, diagnosing and treating various conditions, prescribing medications, and counselling.<sup>20</sup> The Nursing and Midwifery Board of Australia legislates the standards of practice of NPs throughout Australia. Like Canada and the US, the NP scope of practice varies between states and territories. However, in Australia, NPs can order and interpret investigations, order some medications, and perform invasive and non-invasive interventions.<sup>21</sup>

NPs specialization in wound care is most evident in Australia. In 1997, Flanders Medical Centre was the first hospital in Australia to develop and support the NP as a wound management consultant.<sup>22</sup> The NP provided wound care to inpatients throughout the hospital and outpatients with consultation through the community; a multidisciplinary approach met these patients' complex wound care needs. In March 1999, 11 NP models, including wound care, were funded by the Victorian Minister for Health. Followed in 2001 by the Australian Capital Territory funding a trial for a wound care NP model of care.<sup>23</sup>

## 2.1.4 Wound Healing

An acute wound is a wound that heals progressively through the stages through to closure. In comparison, a chronic wound is a wound that does not progress through healing stages as expected. The time for a wound to be considered chronic varies from four weeks,<sup>24</sup> to more than three months.<sup>25</sup> The US Food and Drug Administration (FDA) defines wound healing as 100% wound closure. They further define complete wound closure as re-epithelialization without drainage or the need for dressings for two consecutive visits at least two weeks apart.<sup>26</sup> Complete wound closure is often the primary endpoint for wound healing. However, the FDA also recognizes secondary endpoints such as reduced pain, reduced infection, percent reduction in wound size over 4-8 weeks and reduced recurrence.<sup>27</sup>

As defined by practice guidelines, standard wound care includes debridement, adequate offloading (distribution of pressure), management of underlying co-morbidities, compression, advanced wound products, optimizing nutritional status, and treating infections.<sup>28-30</sup> Additionally, tracking healing trajectories (percent healed over time) allows clinicians to compare their findings with healing times reported in other studies.

Research studies have examined healing outcomes when treating wounds using evidence-based standard care.<sup>31,32</sup> A chart review was conducted at a Canadian hospital by Lu and McLaren.<sup>31</sup> They retrospectively reviewed five years of charts for 279 patients with diabetic foot ulcers (DFU). Their review examined wound healing outcomes, including complete wound closure (re-epithelialization), for patients with DFU receiving care from a chiropody-led interdisciplinary wound care team. More than 81% of the patients with DFU healed over the five years (227/279). The authors found that patients who received offloading with a contact casting were more likely to heal than a healing sandal, non-weight-bearing, or a removable cast walker. Additionally, more wounds located in the forefoot and midfoot healed, compared with DFUs located in the hindfoot. Time to healing was 13.4 weeks for patients using a custom device, 11.4 weeks with total contact casts and 67.9 weeks with non-weight-bearing as the offloading.



Similar healing outcomes were reported in a Canadian study conducted by Roth-Albin et al. Their retrospective study of adult (> 18 years) patients was conducted at a multidisciplinary clinic specializing in outpatient diabetic foot and wound care. Healing rates were determined for 56 participants receiving treatment based on best practice guidelines. The overall healing rate (epithelialization with restored function) at 52 weeks was 67.2% (84/125), and the mortality rate at 52 weeks was 8.9%. Furthermore, Roth-Albin et al.<sup>32</sup> noted participants presenting with multiple DFUs and peripheral vascular disease at the time of referral had a statistically significant association with death or amputation at 52 weeks. Even though this study had a smaller sample size than the study by Lu and McLaren,<sup>31</sup> both studies demonstrated the healing of DFUs using standard care, including offloading. Furthermore, both studies reported decreased healing related to co-morbidities,<sup>32</sup> number<sup>31,32</sup> and location of DFUs.<sup>31</sup>

Researchers have constructed healing trajectories to determine the percentage of wound healing over time.<sup>25,33</sup> Payne et al.<sup>33</sup> constructed healing trajectories for 211 patients with stage III and IV pressure injuries enrolled in eight randomized clinical trials. This study had treatment and placebo groups. Participants in this study received specific treatment protocols ranging between 28 and 112 days; specific treatment protocols were not defined in this paper. The authors did state that the standards of care and the providers were similar for all patients. Their study results indicated that 17% of the total patients had complete healing in 112 days. Further, survival analysis reported that 80% achieved 90% healing in 112 days, and regression analysis suggested it would take approximately 110 weeks for all patients to achieve total healing. Providing details regarding the groups and treatments used in the various studies would have enhanced understanding of this study's interventions and outcomes.

Healing trajectories were also reported in a retrospective study by Zhou et al.,<sup>25</sup> who reviewed 27 months of data from 159 patients with various wound types seen at an outpatient wound care clinic. Patients in this study received conventional wound care (not described), and most patients received electrical stimulation. Additionally, whirlpool therapy, ultrasound, and ultraviolet therapies were provided as needed. Results indicated that at 140 days, 104 (65.4%) patients had complete wound closure, with a future

prediction (linear regression) that all patients should attain closure in just over 24 weeks. In this study, some patients reached 40 weeks of treatment without having attained complete wound closure. The authors state that patients require a change in treatment if there are no improvements in wound healing after 50-75 days. Providing the healing trajectory by wound type would have enriched the results of this study.

Patients receive the best care when evidence influences practice. Research studies have examined healing outcomes using standard care as the treatment with or without other modalities. Standard care must reflect evidence-based guidelines, including the application of compression, offloading, and appropriate support surfaces depending on the wound type. Evidence-based practice guidelines help prevent discrepancies in practice and guide clinicians with cost-effective, research-based treatments. Having an interdisciplinary team using an evidence-informed approach to wound care can reduce costs and improve patient outcomes. The construction of healing trajectories allows comparison of healing across studies to formulate a benchmark for future research and provide clinicians with a guide for wound healing times.

### 2.1.5 Prevalence, Etiology and Treatment of Wounds

Arterial ulcers account for approximately 22% of all leg ulcers, resulting from a lack of arterial blood flow to the area due to a narrowed (atherosclerosis) or blocked artery.<sup>34</sup> These ulcers are usually small painful ulcers with a pale, “punched-out” appearance on the feet or legs. Risk factors for atherosclerosis include advancing age, diabetes, hypertension, dyslipidemia, family history, obesity, smoking, and a sedentary lifestyle.<sup>35</sup> Treatments for arterial ulcers involve local wound care with dressings and topical medications along with medications and exercise to increase blood supply. Advanced adjunctive therapies may be used, such as hyperbaric oxygen, negative pressure wound therapy, skin grafting, and surgical intervention to correct the blood flow issue.<sup>34</sup>

A pressure injury is damage to the skin and underlying soft tissue, usually over a bony prominence; damage results from pressure, pressure combined with shear or injury due to medical devices.<sup>30,36</sup> Prevalence of pressure injuries was explored in a prospective cohort

study by Woo et al.<sup>37</sup> across four Ontario settings. They examined population-level data from administrative health databases on 203,035 patients. Results demonstrated that the average prevalence of pressure injury was 11.2% across all sites. Continuing care had the highest prevalence (22.6%), followed by acute care (10.2%), long-term care (LTC) (8.4%), and home care (3.7%).

Risk factors for developing pressure injuries include admission to a health care facility, decreased mobility, use of devices such as wheelchairs, decreased ability or inability to feel pressure, cognitive impairment, altered nutritional status, and previous or current pressure injuries.<sup>30</sup> Co-morbidities related to pressure injuries include fatigue, daily pain, cardiovascular and cerebrovascular diseases.<sup>37</sup> Clinicians need to be aware of the factors that may cause a breakdown in specific populations such as the elderly, people with a spinal cord injury, critical care admissions, pediatric population, bariatric population, surgical patients, and those who are end-of-life care.<sup>36</sup>

Pressure injury prevention includes managing sheer and pressure by repositioning, mobilization, and appropriate support surfaces. Prevention also requires managing continence, providing skincare, optimizing nutrition, and managing co-morbidities.<sup>30</sup> Managing pressure injuries require an interdisciplinary approach that focuses on prevention strategies to provide local wound care, treat infection, and manage moisture and pain.<sup>30,36</sup> Additionally, treatment may include surgical interventions<sup>30</sup> and advanced therapies (electrical stimulation therapy, electromagnetic therapy,<sup>36</sup> phototherapy,<sup>38</sup> ultrasound.<sup>39</sup>)

Diabetes mellitus affects more than 1 in 10 people<sup>29</sup> or 1.53 million Ontarians.<sup>40</sup> Between 16,600 and 27,600 people<sup>40</sup> or 15% to 25%<sup>29</sup> of Ontarians with diabetes may eventually develop DFUs. Even after wound closure, up to 59% of DFU will recur,<sup>41</sup> and each year, almost 2,000 Ontarians have an amputation secondary to diabetes.<sup>42</sup> The cause of a DFU is multifactorial. Risk factors include peripheral arterial disease, neuropathy, foot abnormalities, and previous ulcers or amputation history.<sup>29</sup> Furthermore, diabetic persons who have had a significant amputation and have a coexisting co-morbidity of peripheral

arterial disease have an increased chance (by 50%) of dying within the next two years after the amputation.<sup>29</sup>

Venous leg ulcers (VLU) affect 1-2% of the population.<sup>43</sup> They are challenging to treat and, even with appropriate care, 20% remain unhealed.<sup>44</sup> Also, recurrence for VLUs is as high as 70%.<sup>45</sup> Seventy percent of leg ulcers are caused by venous disease, while another 20% are mixed, caused by a person having both arterial and venous disease.<sup>43</sup> Risk factors for developing a VLU include family history; previous ulcer, trauma, injury, or vessel disorder; sedentary lifestyle, obesity; multiple pregnancies; impaired calf pump or decreased ankle mobility.<sup>28</sup> Prevention of VLUs include compression therapy, leg exercises (calf pump) and elevation.<sup>28</sup>

Treatment of VLUs includes preventative measures, along with local wound treatment, lower extremity compression (bandaging, stockings or other), intermittent pneumatic pressure, systemic agents (pentoxifylline, micronized purified flavonoid fraction), venous surgery, and advanced therapies (growth factors, tissue constructs, electrical stimulation, negative pressure wound therapy, ultrasound).<sup>45</sup> Optimal healing for venous leg ulcers is defined as a 25% - 30% reduction in size after four weeks.<sup>28</sup>

### 2.1.6 Cost of wounds

The total cost of wound care is difficult to estimate, as both direct and indirect costs are involved. Direct costs include resources and treatments needed, while indirect costs are losses related to illness. Some of the indirect costs to individuals include the impact on the quality of life (inability to work, frequent appointments, social isolation),<sup>28</sup> decreased mobility,<sup>29</sup> embarrassment, depression, anxiety,<sup>46</sup> and pain.<sup>28</sup> It is estimated that wound care costs Canada \$3.9 billion annually in 2013,<sup>46</sup> with an expectation to increase 30% by the end of 2020.<sup>47</sup> In Ontario, the annual cost is estimated at \$1.5 billion. Furthermore, providing wound care is costly, using up to 50% of home care services.<sup>48</sup>

The provision of wound care directly impacts Ontario's health care system, and the costs vary based on wound type. The direct cost to the health care system for DFUs ranges from 320-400 million dollars with indirect costs between \$35-\$60 million.<sup>40</sup> The per-case

cost of caring for a patient with a diabetic foot ulcer (DFU) in Canada is \$21,371, including community care costs of \$9,934.<sup>49</sup> The cost of amputation is 10 to 40 times greater than the cost of prevention;<sup>46</sup> an offloading device ranges from \$100 to \$1500,<sup>40</sup> compared to an amputation estimated at \$70,000 per limb.<sup>42</sup> Preventative initiatives for DFUs can result in an annual cost savings of 48 to 75 million dollars.<sup>40</sup>

The annual cost of pressure injury management for individuals with spinal cord injuries residing in the community is estimated between \$173 and \$316 million.<sup>50</sup> Annual venous ulcer cost in the community was estimated by one Ontario Local Health Integration Network (LHIN) to be over \$500,000 with an average per-patient cost of \$1631 (n=300).<sup>51</sup> An American study by Nussbaum et al.,<sup>52</sup> using 2014 data, found that the annual wound costs (US dollars) for arterial wounds was 2 billion dollars. It is estimated that there will be a savings of \$338 million by adopting best practices, with another \$24 million from reduced hospitalizations.<sup>53</sup>

The high cost of wound care creates a financial burden on the Canadian health care system. As the population ages, the incidence and prevalence of wounds associated with age-related chronic disease will continue to drive costs. Accordingly, wound care provision should improve the underlying disease while providing evidence-informed treatments and improving access to care.<sup>54</sup> Alternative levels of care need to be established that improve access to wound care, increase community resource utilization and reduce costly acute care treatments. A wound care service led by an NP with advanced education in wound care could improve wound care access and decrease nonurgent ED visits for wound care.

### 2.1.7 Local Health Integration Network

In 1996, the MOHLTC established Community Care Access Centres (CCACs) to provide the public with access to government-funded home, community, and LTC services. The CCACs followed the *Home Care and Community Service Act* (1994) regulations and the *Community Care Access Corporation Act*, 2001. The MOHLTC passed the *Patients First: Action Plan for Health Care* (2015), which included expanding the role of the 14 LHINs,

giving them authority over managing CCACs throughout Ontario.<sup>54</sup> The expanded LHINs continued to implement home and community services to Ontarians based on client need and eligibility. LHINs provide referral services, initiate admissions to LTC facilities, and coordinate care from acute care to the community by linking patients with the appropriate services.<sup>55</sup> One mandate of the LHIN is to decrease ED visits by diverting patients who can safely receive care and support in community settings.<sup>56</sup> Nonurgent wound care is a condition that could be redirected out of the ED.

### 2.1.8 Emergency Departments

Wait times in EDs are longer in Canada than in other countries, with most patients waiting four or more hours before receiving any treatment.<sup>57</sup> These wait times are an issue causing delays in treatments, patient dissatisfaction, and patients leaving before being treated.<sup>57</sup> In Canada, patients presenting to EDs are assigned a triage level based on their acuity and the urgency to receive care. RNs use the Canadian Triage Acuity Scale<sup>58</sup> (CTAS) to assign one of the following triage levels: I- Resuscitation, II-Emergent, III-Urgent, IV- Less urgent, V-Nonurgent. Annually in Canada, over 3 million patients are triaged as Level IV (less urgent) or Level V (nonurgent).<sup>59</sup> The management of these patients costs the health care system \$400 million per year.<sup>60</sup>

In 2008, the Ontario government instituted A Pay for Results Program to combat high wait times. This program offered performance incentives for meeting specific wait time targets. Targets for CTAS level IV and V patients were four hours, and meeting that target meant receiving an incentive of \$100 per patient. Incentives totalling 100 million dollars were paid to Ontario hospitals in 2011 to help reduce wait times.<sup>61</sup> Unfortunately, these incentives further increase health care costs and encourage clinicians to treat nonurgent patients faster.

### 2.1.9 NPs and Wound Care

An advanced scope of practice provides opportunities for NPs to oversee patients requiring wound care. The *Practice Standard Nurse Practitioner*<sup>14</sup> outlines controlled

acts that would permit NPs to provide wound care independently. Controlled acts that could pertain to wound care include:

- Communicating a diagnosis.
- Performing procedures below the dermis or mucous membrane.
- Putting an instrument, hand or finger into an orifice or artificial opening in the body.
- Applying and ordering the application of a prescribed form of energy.
- Setting or casting a fracture or dislocation.
- Administering substances by injection or inhalation.
- Prescribing, dispensing, or compounding a medication.<sup>14</sup>

Regulations to acts of other health care professions allow the NP to prescribe medication and order laboratory or diagnostic tests necessary for an NP to work to full scope.

Additionally, NPs can initiate referrals to specialists<sup>14</sup> and other health care providers whose services require prescriptions, promoting a consultative and collaborative practice.

### 2.1.10 Nurse Practitioner Wound Care Education

Graduate-level NP education, through the Ontario Primary Health Care NP Program,<sup>62</sup> provides students with information related to diagnosing and managing acute and chronic wounds. The curriculum offers online and seminar instruction related to various wound-related conditions, including traumatic wounds (minor lacerations or tears of the skin, animal bites, human bites); chronic wounds (pressure, venous, arterial, and diabetic ulcers); peripheral vascular (venous and arterial disease); skin cancer, burns, and infections.<sup>62</sup> Additionally, clinical placements in the NP program provide opportunities for hands-on application of knowledge. Unfortunately, the NP program's wound care component is predominately self-directed learning, and depending on the placement site, there may be limited opportunities for hands-on application of knowledge. Graduate-level wound care education through a Master's program or as a Nurse Specialized in Wound, Ostomy and Continence (NSWOC) provides advanced wound care knowledge.

Additional clinical experience enables NPs to provide comprehensive evidence-informed

wound care within their scope of practice. As part of an interdisciplinary team, an NP with advanced wound care education can coordinate care and facilitate referrals, diagnostic testing, and treatments.

NPs are an excellent choice to manage wound care as they provide accessible,<sup>63</sup> cost-effective,<sup>63,64</sup> evidenced-based, safe, and effective care.<sup>65</sup> NPs can practice collaboratively within a health care team<sup>66</sup> functioning as a consultant, educator, and researcher<sup>64</sup> with the ability to coordinate patient care from acute through to the community.<sup>67</sup> They have the skill set to evaluate and treat wounds while managing the patient's overall care. Improving healthcare systems requires innovations in the delivery of health care, including increased utilization of NPs.<sup>68</sup> The scope of practice and regulation of NPs make them ideal for providing wound care independently or collaboratively. Literature is scarce in Canada regarding NPs and wound care. Therefore, global examination of the role of NPs in providing wound care will aid in developing the role in Canada. Research in Canada regarding NPs and wound care would help alleviate this gap and provide guidance for NPs interested in wound care. A narrative literature review was undertaken to identify and summarize published literature on nurse practitioners and wound care.

## 2.2 Methods

This narrative literature review was conducted to identify and present a summarization of articles relevant to NPs and the provision of wound care globally. Specifically, to examine 1) NP wound care practice. Sub questions include 2) the setting of NP wound care practice, and 3) diagnoses in the NP wound care practice.

### 2.2.1 Inclusion Criteria

The review considered global studies that include an NP or APN whose practice predominately includes providing wound care whether independently or as a part of a team. APN was included if the APN was an NP with a protected title and a regulated scope of practice. NP profiles were excluded.



## 2.2.2 Information Sources

A database search of MEDLINE via Ovid and Cumulative Index of Nursing and Allied Health Literature (CINAHL) Complete was undertaken to identify articles on this topic. The articles found on the topic were analyzed for text words in the title and abstract and keywords and index terms used to describe each article. Studies published in English were included, published in or after 1998, to reflect relevant NP literature. The full search was conducted on August 17, 2018, with a follow-up search on March 11, 2020, using the following queries:

Medline: 1) exp nurse practitioners/ or (advanced practice nursing).sh.; 2) (nurse practitioner\* or advanced practice nurs\*).ti,ab,kw.; 3) (wound management or wound care or wound treatment).ti,ab,kw. 4) 1 or 2; 5) 3 and 4; 6) limit 5 to (english language and yr="1998 -2020")

CINAHL: 1) TI ( "wound management" OR "wound care" OR "Wound treatment" ); 2)AB ( "wound management" OR "wound care" OR "Wound treatment" ); 3) MH ("wound care"); 4)S1 OR S2 OR S3; 5)MH ("Nurse practitioners+" OR "Advanced nursing practice"); 6) TI ("nurse practitioner" OR "nurse practitioners"); 7)AB ("nurse practitioner" OR "nurse practitioners"); 8)S5 OR S6 OR S7; 9) S4 AND S8 Published Date: 19980101-2020; English Language.

Following the search, all identified citations were uploaded into Zotero© and imported into the systematic review manager Covidence©. Duplicates were removed, and titles and abstracts were screened for assessment against the reviewer's inclusion criteria. Studies that met the inclusion criteria were retrieved in full and assessed in detail against the inclusion criteria.

## 2.2.3 Data Extraction and Presentation

Data were extracted from papers included in the narrative review and presented in a descriptive format that aligns with this narrative review's objective. The extracted results are organized and summarized under categories that reflect the questions of interest: 1)

NP wound care practice and 2) setting of NP wound care practice, and 3) diagnoses in the NP wound care practice. Each article was summarized and included the following information: the author(s), year of publication, country of origin, purpose, population, sample size, methodology, concepts of interest, outcomes and key findings relating to the narrative review questions.

## 2.3 Results

Two hundred and four articles were screened by examining abstracts and titles; 137 were deemed irrelevant. Sixty-seven full-text articles were assessed. Sixty-one records were excluded based on the following: they were duplicates (3), did not address any review questions (40), were an NP profile (3), or did not discuss the role of an NP (15). The remaining six records were extracted for synthesis as they met the inclusion criteria of this review: The sources for this narrative review were analyzed, summarized, and grouped according to categories outlined under data presentation. Some sources had findings that overlapped multiple research questions. As such, information was included under multiple categories.

### 2.3.1 Characteristics of included studies

The sources for this narrative review represented a small global context: Australia (4), United States (2) There was one paper describing an aspect of a larger investigation,<sup>69</sup> and three studies (scoping study using a questionnaire,<sup>64</sup> retrospective quality improvement study,<sup>70</sup> retrospective chart audit<sup>71</sup>). There was also a case study<sup>72</sup> and an article describing an NP-Led wound outreach service.<sup>73</sup>

MacLellan et al.<sup>69</sup> described one aspect of a larger 10-month observational study to investigate a new NP wound care health service model. Their paper discusses part of a larger study that examined four NP care models in the Australian Capital Territory (ACT) and surrounding New South Wales. This study examined the NP wound care model's scope of practice and outcomes regarding access, safety, and clinical efficacy.

Recruitment was based on referrals from the hospital by nursing and medical staff.

Patients were excluded if they could not give informed consent and were provided with

alternate care. Data collection and analysis reflected: clinical practice (treatment, diagnostics ordered, referrals); patient outcomes (safety and effectiveness); clinic teams reviewed NP's decisions; and surveys from patients and health professionals. The research was approved by the ACT Human Research Ethics Committee and funded by the ACT Department of Health and Community Care and the Nurses Board of the ACT.

Gibb et al.<sup>64</sup> conducted a scoping study utilizing an online questionnaire to examine wound management nurse practitioner (WMNP) models to identify practice parameters and determine how patient outcomes were measured. The tool, comprised of 59 questions, was distributed to 21 WMNP Online Peer Review Group members in Australia. Fifteen practicing WMNPs completed the questionnaire, and descriptive analysis was provided for the items. Ethics approval was obtained from the Human Research Ethics Committee, Queensland University of Technology. Limitations for their study included small sample size and sample bias by only offering the questionnaire online. Seaman<sup>72</sup> outlined a case presentation regarding the care of a patient with a diabetic foot ulcer in an NP-managed Wound Healing Center.

Irvin et al.<sup>70</sup> conducted a retrospective quality improvement study to determine if hiring an NP as a wound care consultant impacted the rates of hospital-acquired pressure injuries (HAPI). A retrospective comparison design was used to examine 48 months of data (May 2010–2014) from the National Database for Nursing Quality Indicators (NDNQI); 10,752 patients were divided into two groups, 24 months before and after hiring. Included patients received monthly skin assessments recorded in the National Database of Nursing Quality Indicators (ND-NQI) pressure injury survey. Patients excluded were those refusing assessment, those not on the unit, or those who were dying or too critical to receive a full skin assessment. Comparison of the two groups included using a Pearson's correlation coefficient and an independent t-test and logistic regression to exam differences. The Institutional Review Board (IRB) of the hospital approved the study. Results indicated that HAPI rates were lower with NP wound care consultants' introduction, demonstrated by an inverse correlation ( $r=-0.73, n=60, p<.01$ , two-tailed test). A t-test indicated a decreased mean number of pressure ulcers from before ( $M=9.5, SD=5.3$ ) to after ( $M=1.6, SD=1.5$ ) hiring NPs as consultants ( $t(58)=8.01, p=.00$ ). Logistic

regression indicated that the odds of a HAPI occurring after hiring the NPs were 20% of the odds of occurrence before the NP. Limitations included conducting the study at one hospital and being a retrospective study, did not account for patient and nurse characteristics or unit scheduling that may have impacted the study.

Gibb et al.<sup>73</sup> described an NP-Led Wound Healing Community Outreach Service that addresses patients' physical and psychosocial needs. Carville et al.<sup>71</sup> conducted a three-year retrospective chart audit (March 2013 to September 2016) on 348 patients with 432 wounds from three Advanced Wound Assessment Service (AWAS) clinics to examine healing times when NPs used low-frequency ultrasound debridement (LFUD). Patients were included who had a non-healing, deteriorating, or atypical presentation. This study was a retrospective chart audit; therefore, it does not account for patients' or providers' characteristics that can impact the study.

### 2.3.2 NP wound care practice

Four articles described the wound care practice of nurse practitioners: MacLellan et al.,<sup>69</sup> Gibb et al.,<sup>64</sup> Seaman,<sup>72</sup> Carville et al.<sup>71</sup> In the paper discussing an aspect of the 10-month NP wound care trial by MacLellan et al.,<sup>69</sup> there were 42 patients, between the ages of 11 and 88, with 184 patient visits ranging from 1-17. A clinical decision team found the NP practice safe and appropriate, with a 100% agreement on the assessment and patient management. During the trial, interventions included complex dressings, Doppler studies, ankle-brachial indexes, wound biopsies, compression bandaging, conservative sharp surgical debridement and patient education. The NP prescribed medications for 35% of the patients (8% of visits), including mild oral analgesic, topical antimicrobials, and corticosteroids. If antibiotics were required, the case was discussed with the infectious disease physician. Forty-two patients had diagnostic or laboratory testing, including wound swabs, blood tests, and x-rays. Referrals were initiated in 86% of the cases to initiate multidisciplinary follow-up with primary care providers and community nurses for ongoing management, medical specialists, podiatrists, orthotists and physiotherapists. Thirty-eight cases had improved outcomes. Surveys were sent to 28 study participants after completion of care. Respondents (n=20) (75% response rate) had a high level of

satisfaction with the service and reported that they would see an NP again. Respondents also indicated that the NP was efficient, friendly, informative, responsive to concerns, and was a link providing access to specialists.

Gibb et al.<sup>64</sup> had 15 respondents (71%) to their questionnaire. The WMNPs mostly treated adults over the age of 60. Interventions included wound photography (83%), patient/family/caregiver education (75%), performing Doppler ankle–brachial pressure index assessment (58%), conservative sharp wound debridement (58%), counselling (50%) and other activities (monofilament testing, ultrasonic debridement, monitoring and follow-up, and medical/ staff education). The WMNP most often prescribed topical anesthetics (25%) and corticosteroids (16%). Twenty-five percent of the WMNP prescribed oral antibiotics; intravenous antibiotics were prescribed least often. Most of the WMNPs (60%) did not have admission privileges; however, 33% had discharge privileges. Referrals were as follows: o GPs (80%), community nurses (50%), medical specialists (33%), foot specialists (33%), and allied health professionals (25%). There was no discussion surrounding laboratory or diagnostic testing in this study.

Seaman<sup>72</sup> provided the plan-of-care for all chronic wounds and described specific care provided to one patient with a diabetic foot ulcer in an NP-managed Wound Healing Center. The NP's approach for managing all patients with chronic wounds included: 1) identify and address pathology, 2) manage systemic factors, 3) debride necrotic tissue, 4) treat infection, 5) use topical and advanced therapies. The case presentation's specific interventions included assessment, monofilament testing, debridement, patient education, referral for offloading and diabetes education, compression stockings, and follow-up.

Carville et al.<sup>71</sup> described the low-frequency ultrasound debridement (LFUD) performed by the NP. Topical analgesia EMLA™ or topical lignocaine 4% was applied 20 minutes before debridement. LFUD involved applying a 30–50 kHz handheld Sonoca® probe with normal saline coupling medium to the wound bed for 20 seconds per mm<sup>2</sup> ulcer area, followed by applying an antimicrobial dressing. LFUD was performed weekly until the elimination of necrosis and localized infection; this took an average of four to six treatments. Antimicrobial dressings were applied with a secondary absorbent pad to

reduce the risk of infection. Sixty-seven percent of the wounds healed with LFUD; 33% received referrals for further investigations through their primary care provider. The mean number of days to healing after LFUD was 115.6 days.

### 2.3.3 Settings of NP wound care practice

Six articles described the setting of wound care practice of nurse practitioners: MacLellan et al.,<sup>69</sup> Gibb et al.,<sup>64</sup> Seaman,<sup>72</sup> Irvin et al.,<sup>70</sup> Gibb et al.<sup>73</sup> Carville et al.<sup>71</sup> A 10-month trial by MacLellan et al.<sup>69</sup> was conducted in The Canberra Hospital, a 591-bed tertiary and teaching hospital which provided services to approximately 500,000 people. The wound care NP practiced with a support team in a clinical setting four days per week and had one day of group learning with other NPs. Most WMNPs in the questionnaire by Gibb et al.<sup>64</sup> worked in the public sector (n= 15; 93%), with 46.7% working in tertiary or local hospitals. Another 26.7% worked in the community, 6.7% in long-term care and 20% selected other. Those working in acute care ran clinics multiple days during the week. Seaman<sup>72</sup> described the setting as NP-managed Wound Healing Center in the US. The retrospective quality improvement study by Irvin et al.<sup>70</sup> included adult ( $\geq 18$  years) inpatients in a large community hospital. The NP-Led Wound Healing Community Outreach Service discussed in the article by Gibb et al.<sup>73</sup> was located at the Queensland University of Technology in Brisbane, Queensland, Australia. The setting for the retrospective chart audit conducted by Carville et al.<sup>71</sup> was an NP coordinated Advanced Wound Assessment Service established by Silver Chain, a community nursing service in Western Australia.

### 2.3.4 Diagnoses in the NP wound care practice

Six articles discussed diagnoses in the NP wound care practice: MacLellan et al.,<sup>69</sup> Gibb et al.,<sup>64</sup> Seaman<sup>72</sup> Irvin et al.<sup>70</sup> Gibb et al.<sup>73</sup> Carville et al.<sup>71</sup> The 10-month trial conducted by MacLellan et al.<sup>69</sup> found the following diagnoses in the NP wound care model: chronic leg ulcers, infected leg wounds, cellulitis, pressure ulcers, diabetic foot ulcers, traumatic wounds, fungating tumours, spider bite, shingles, pilonidal sinus, perineal, fistula and a post-operative sinus wound. Similarly, the WMNPs in the questionnaire by

Gibb et al.<sup>64</sup> reported treating mainly chronic wounds such as leg ulcers, diabetic foot ulcers, pressure injuries, malignant wounds, and complicated post-operative wounds. Seaman<sup>72</sup> examined one patient with a diabetic foot ulcer, while the study by Irvin et al.<sup>70</sup> involved patients with pressure injuries. The article by Gibb et al.<sup>73</sup> did not explicitly discuss the types of wounds treated by the NP but stated that 90% of leg ulcers healed from 2008-2011 (venous leg ulcers (94%), mixed venous (72%), arterial leg ulcers (54%)). Carville et al.<sup>71</sup> performed retrospective chart analysis of 348 clients with 432 wounds of mixed aetiologies, most being venous leg ulcers (n=243).

## 2.4 Discussion

This literature review has demonstrated the success of the NP-Led programs in primary care and LTC facilities in Ontario and patient satisfaction with NP care. International literature in the US and Australia shows evidence related to successful NP practices in wound care. The sources from this narrative review outline the settings where NPs provide wound care, the NP scope of practice, and the diagnoses of wounds treated in these services. The practice of the NP is similar in Canada to international studies discussed in this narrative review.

This narrative review provides information to guide NP wound care role development in Canada, and more specifically, in Ontario. Unfortunately, with the scarcity of published literature in Canada related to NP-Led wound care services, additional research is needed to address this gap and provide guidance for agencies or NPs interested in wound care.

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## Chapter 3

### 3 Developing a Nurse Practitioner Community Wound Care Service Utilizing the PEPPA Framework

Alternative delivery models of care are necessary to navigate the complexity and ongoing rise of Ontario's health care costs (Canada). Nurse Practitioner (NP) led clinics are an alternative model of care currently used throughout Ontario. At present, there are 27 primary care NP-Led clinics located in various Ontario cities.<sup>1</sup> These clinics are a unique model, delivering primary health care using nursing leadership within an interprofessional team.<sup>1</sup>

NP-Led clinics provide patients with comprehensive primary care across the lifespan. These clinics offer services from various health care providers and provide referrals to additional specialists as needed. NP-Led clinics use an evidence-informed approach to provide patients with access to primary health care and reduce the number of people without providers.<sup>1</sup> Advanced practice nursing models, such as NP-Led clinics, have been shown to provide quality care for individuals and populations and contribute to reduced health care costs.<sup>2</sup>

Future restructuring of the hospitals in an urban city in Southwestern Ontario (two hospitals merging into one) provides a timely opportunity to improve wound care delivery in this area and investigate the value of adding an NP-Led community-based wound care service as an alternate model of care.

Based on the NP model of care, a quality improvement project (QIP) using the Participatory, Evidence-Based, Patient-Focused Process for Advanced Practice Nursing (PEPPA) Framework,<sup>3</sup> was undertaken to determine the need for an NP-Led community-based wound care service in an urban city in Southwestern Ontario. This QIP was a joint venture with the Local Health Integration Network (LHIN) and a local community clinic. The QIP aimed to improve community wound care and reduce avoidable (nonurgent) emergency department (ED) visits for patients receiving home care services through the

LHIN. Patients seeking care for wounds in the ED are a frequent practice in this region. The lack of community access is a gap in services that this QIP sought to address.

## 73.1 Background

### 73.1.1 Nurse Practitioner

The College of Nurses of Ontario implemented *Practice Standard Nurse Practitioner*,<sup>4</sup> which outlines the controlled acts NPs are authorized to perform as part of their advanced nursing practice role. Controlled acts include communicating a diagnosis, performing procedures below the dermis, putting an instrument into an opening of the body, ordering or applying energy (such as ultrasound), prescribing, administering, dispensing, selling, or compounding medications.<sup>4</sup> Other authorized activities for the NP include ordering diagnostic tests and collaborating or consulting with other health care providers, including initiating referrals to specialists.<sup>4</sup>

The Ontario Primary Health Care Nurse Practitioner Program is predominately self-directed learning. Students receive theoretical knowledge regarding the assessment and treatment of various wounds. Unfortunately, clinical application regarding wound care is often dependent upon the placement and the preceptor's knowledge. Obtaining advanced education in wound care, particularly at a master's level, provides additional knowledge and clinical application. Combining advanced education in wound care with the NP program's knowledge enables NPs to provide evidence-informed care (NP(W)).

### 73.1.2 PEPPA Framework

This QIP utilized the PEPPA Framework<sup>3</sup> (see Appendix C for PEPPA Framework) as it is an evidence-based tool developed by Bryant-Lukosius and DiCenso to facilitate role development, implementation, and evaluation of advanced practice nurse (APN) roles<sup>3</sup>. The Canadian Nurses Association endorses using the PEPPA Framework as a guiding tool when introducing NP roles into different practice settings.<sup>5</sup>

Sixteen countries have used the PEPPA Framework in various practice settings and populations.<sup>2</sup> A literature review by Boyko, Carter, and Bryant-Lukosius<sup>6</sup> noted a continual uptake of the framework, since its inception in 2004, for role integration into clinical practice. Specifically, in Canada, Gresley-Jones et al.<sup>7</sup> used the PEPPA Framework to guide role development, implementation, and evaluation of an NP-Led Complex Care Clinic for children with complex medical conditions.

Additionally, McNamara et al.<sup>8</sup> studied the implementation of a new role in Quebec, that of a specialized NP, into a hospital in Montreal; the PEPPA Framework guided the role development of the specialized NP into this hospital. In their literature review, Doetzel, Rankin, and Then<sup>9</sup> provide an overview of the PEPPA framework suggesting its use in addressing fee-for-service barriers impeding NP integration into the ED. Finally, Martin-Misener, Reilly, and Vollman<sup>10</sup> conducted a mixed-method study using the PEPPA Framework as their conceptual framework to define the role of primary health care NP in Nova Scotia.

The PEPPA Framework includes nine steps:

1. Define the population and describe the current model of care.
2. Identify stakeholders and recruit participants.
3. Determine the need for a new model of care.
4. Identify priority problems and goals to improve the model of care.
5. Define the new model of care and APN role.
6. Plan implementation strategies.
7. Initiate APN role implementation plan.
8. Evaluate the APN role and new model of care.
9. Long-term monitoring of the APN role and model of care.

The purpose of the QIP was to obtain feedback from key stakeholders to determine the need for and, if warranted, develop an NP(W)-Led community-based wound care service. Study approval was sought through two University Research Ethics Boards (REBs); both determined that a QIP did not require ethics approval (see Appendix D for REB QIP Letters).

## 73.2 Objectives

Specific objectives for this QIP include:

1. Identify key stakeholders and attain their support for developing an NP(W)-Led community-based wound care service.
2. Conduct semi-structured interviews and stakeholder focus groups to obtain ideas for developing the NP(W)-Led wound care service.
3. Determine facilitators and barriers to implementing an NP(W)-Led wound care service
4. Incorporate key stakeholders' ideas to develop the NP(W)-Led wound care service, including developing a care model, determining the conditions and individual health concerns that would most benefit from this service, and developing referral and treatment processes.

The QIP aligns with the Ontario Ministry of Health and Long-Term Care (MOHLTC) mandate to promote community-based support that allows patients access to the right care, in the right environment, by the right provider.<sup>11</sup> Furthermore, information from this QIP will help to fill a gap in services noted by Health Quality Ontario, an agency that advises the MOHLTC. In particular, Health Quality Ontario reports a lack of access and provision of wound care services across Ontario.<sup>3</sup>

## 73.3 Utilizing the PEPPA Framework

### 73.3.1 Step 1. Defining the Population and Describing the Current Model of Care

In one urban city in Southwestern Ontario, a person who has a wound often receives a referral through an approved provider (physicians or NPs) to the local LHIN for services. Additionally, patients can self-refer themselves to the local LHIN; unattached patients are provided with an NP through the local LHIN for their primary health care. Once the provider assesses a patient, a fax is sent to the local LHIN requesting services and

outlining a specific treatment plan. Case managers at the local LHIN process the treatment orders and then send out a service request to nursing provider agencies in the community to initiate the wound care. The patient will either continue having ongoing assessments with the initial provider that referred them to the LHIN or use an alternate provider. Patients may elect to attend the ED to receive wound care. Additionally, community nurses may ask patients to go to the ED for consultation or wound care that may be either urgent or nonurgent. Unfortunately, sending patients to the ED for nonurgent wound care reinforces unnecessary ED use.

### 73.3.2 Step 2. Identify Stakeholders and Recruit Participants

Stakeholders are individuals, groups, or organizations that can affect or are affected by practice changes in the environment.<sup>12</sup> It is essential to have stakeholders with expertise in the clinical area and those with knowledge regarding the setting.<sup>13</sup> These stakeholders are essential for successful strategic planning as they increase the chance of a project's success. Stakeholders offer vital insight to identify potential problems, define unmet needs, and provide motivation for addressing issues.<sup>12</sup>

Interviews and focus groups are cost-effective methods to obtain information from a group of individuals. Semi-structured interviews involve asking predetermined open-ended questions allowing selected interviewees the opportunity for an in-depth discussion on a particular topic.<sup>14,15</sup> A disadvantage of interviews is the interviewee may tailor responses to what they feel is appropriate and only provide the information they are comfortable with.<sup>15</sup>

Focus groups allow researchers to moderate a discussion between a selected group of individuals to examine their views, opinions, and experiences regarding a selected topic.<sup>14</sup> Disadvantages of focus groups include the potential for data manipulation and the possibility that researchers assume group and personal views are the same.<sup>14</sup>

### 3.3.2.1 Population/Sampling

Initial stakeholders were identified and engaged by the researcher NP(W), the QIP lead and an NP working in the local ED. Initial stakeholders were selected based on their power to influence the project and those directly providing clinical services. Sampling involved using a snowball method,<sup>16</sup> whereby initial stakeholders suggested additional participants until the inclusion of all suggested participants achieved saturation. Once identified, stakeholders were organized into groups for interviews and focus groups. Interviews were selected for management as they allow them to offer information that they may not want to share in a group environment.<sup>14</sup> Input from patients who routinely received wound care in the ED was important as this group could impact an NP(W)-Led wound care service. The NP(W) approached these patients during the usual course of her work. Those who showed interest received a self-addressed postage-paid envelope to fill out the questionnaire and return.

### 3.3.2.2 Inclusion/Exclusion

Inclusion criteria included persons: 1) 18 years or older, 2) associated with the local ED, LHIN, or the community clinic who had a vested interest in optimizing wound care and improving patient outcomes for people registered to receive wound care through the local LHIN. Exclusion criteria included persons who: 1) refused to participate, or 2) did not meet the inclusion criteria.

### 3.3.3 Step 3. Determine the Need for a New Model of Care

In this Southwestern Ontario city, there is no established wound care clinic. Therefore, patients receive initial, and follow-up wound management from multiple providers in various settings, including the ED. Unfortunately, seeking wound care in the ED may result in patients receiving repetitive, inconsistent care, which may not reflect current best practice guidelines.

Restructuring of hospitals in this region provided preparatory work that identified the need and willingness for a new care model. The restructuring committee felt that this was

an opportunity to consider establishing an outpatient NP wound management program.<sup>17</sup> Furthermore, a discussion with the director of patient services for the local LHIN in this region revealed a readiness for a project that would improve wound care services in the community and reduce ED visits for patients receiving wound care.

### 3.3.4 Step 4. Identify Priority Problems and Goals to Improve the Model of Care

Input from stakeholders was sought regarding wound care in the ED, suggestions to implement an NP(W)-Led community-based wound care service, facilitators, and barriers to implementing it. Feedback was collected from stakeholders using three methods, including semi-structured one-on-one interviews, small focus group meetings, and written feedback via questionnaires. The tape recording of individual interviews and focus groups allowed for verbatim transcription and accurate interpretation of participants' answers. Stakeholder participation included individual interviews with leaders in the local LHIN and the community clinic, small focus groups or questionnaires for staff and clinicians working in the ED and the local LHIN, and questionnaires for patients to provide feedback.

Leaders from the local LHIN and a community clinic who participated in one-on-one interviews were asked the following questions about current wound care service provided through the ED: 1) what do we (local LHIN and ED) do well? 2) what is not done well, or what are the challenges when providing wound care in the ED? 3) is there something that can be done to improve wound care services to the community? The responses from management helped solidify focus group questions. Patients and nurses or physicians who provided wound care in either the community or the ED were asked, via focus group or questionnaire, the following questions to examine ED use: 1) what are the benefits of providing wound management in the ED? 2) what are the disadvantages of providing wound management in the ED? The focus groups' responses helped determine the NP(W) scope of practice and the essential services required to reduce nonurgent ED visits for wound care. Focus group participants were also asked the following questions to provide suggestions for implementing the NP(W)-Led wound service: 3) what are the



facilitators for developing a wound care service? 4) what are the barriers to developing a wound care service? 5) any other ideas or suggestions? For instance, how will referral work?

All participants received a letter of information and signed a consent to participate. The Letter of Information outlined the study's purpose, inclusion and exclusion criteria, procedures, consent, compensation, voluntary participation, confidentiality, data storage and destruction, contacts for further information, and the potential for publication of the findings (See Appendix E). Potential stakeholders read the letter of information, and the researcher answered any questions before obtaining written consent and before initiation of any interviews or focus groups.

### 3.3.4.1 Data Analysis

Before data analysis, the researcher listened to the interviews and focus groups' tape recordings and created an abridged transcript. Content analysis was the technique used to assess the data. This technique required the data to be condensed, labelled, and grouped into categories of related labels, ultimately formulating summaries or themes.<sup>18</sup>

## 3.4 Results

The NP(W) (QIP lead) met with all potential stakeholders over two months. Forty-three stakeholders provided feedback for the QIP. Due to the hectic atmosphere of clinical settings and to allow anonymity, participants from the local LHIN and ED were given the option of participating in a tape-recorded focus group or filling out and returning a questionnaire, which contained the same questions. Four managers completed interviews, and 34 participants completed the focus groups (community n=12, ED n=22), with seven of the ED staff electing to fill out questionnaires. Additionally, two ED patient participants completed the questionnaires.

Four managers provided interviews, three from the local LHIN (one male, two female) and one male from a community clinic. The local LHIN focus group consisted of two groups of 6 female community nurses (RNs, RPNs, Wound Ostomy and Continence

(WOC) nurses, and case coordinators) with various wound care education ranging from workshops and institutional training to master's degree. The ED focus groups consisted of 19 RNs (4 males and 15 females) and three ED physicians (all males) over two occasions. The patient participants from the ED were both females. Collation of focus group data examined significant comments, looking for similarities in and across interviews and focus groups. Information provided by participants highlighted three key messages 1) the ED is not the appropriate place for the provision of nonurgent wound care, 2) the expanded scope of practice of an NP with advanced wound care education (NP(W)) is an asset, and 3) recommendations for a community-based wound care specialty service.

### 3.4.1.1 Inappropriateness of the Emergency Department for Nonurgent Wound Care.

Stakeholders described the ED as an inappropriate location to provide nonurgent wound care. All interviewees felt that providing wound care in the ED was time-consuming, costly, and used valuable resources allocated for emergent care. The hospital staff reported that they did not have the time or resources to manage complex wounds in the ED adequately. Some participants felt that the ED ordered many unnecessary diagnostic tests (laboratory and radiology) and prescribed antibiotics too often. Furthermore, nurses, physicians, and management emphasized the long wait times in the ED for patients to receive treatment. These groups identified parking considerations and transportation concerns as barriers to utilizing the ED for wound care.

One focus group participant believed that providing wound care in the ED, with all services and results readily available, perpetuated ED use. Nurses and clerical staff reported considerable delays sending reports and receiving new orders from the ED. Patient participants felt they did not receive direction on when to return to the ED and felt it was left up to them to decide if their wound was 'bad enough' to require an ED visit. Some stakeholders noted a lack of knowledge about advanced wound care dressings and inconsistency with the care received in the ED. Others felt physicians had other priorities and were not always familiar with current wound care best practices. Stakeholders also pointed out that the ED lacked the same formulary (product list) as the community,

resulting in orders for products that were not available in the community. Besides, stakeholders felt that the proximity of the beds and chairs in the ED did not allow privacy. Moreover, based on the type of setting, there is a higher risk of immunocompromised patients contracting other illnesses or potentially contaminating wounds.

### 3.4.1.2 Nurse Practitioner with Advanced Wound Care an Asset.

Stakeholders were familiar with having an NP with advanced wound care knowledge (NP(W) in the ED. They reported having an NP(W) a benefit for people presenting to the ED for wound care. Stakeholders believed that patients expected and received consistent, best-practice treatment from an NP(W). Consequently, orders written by an NP(W) were concise and reflective of best practice. Stakeholders felt that many patients were already familiar and comfortable receiving wound care from the NP(W) in the ED. Therefore, they would be willing to go to community-based service. Besides, community nurses were familiar with the NP(W) and would be willing to refer patients. They felt that patients referred to the clinic would receive wound care that was currently out of the a registered nurse's scope of practice. Stakeholders felt the NP(W)-Led wound care service should be a one-stop-shop with the ability to provide multiple services (lab, x-ray, laboratory, pharmacy) during the same visit. These services would reduce the need for nonurgent referrals to the ED. On the other hand, stakeholders felt confident that the NP(W) would refer urgent patients to the ED if the appropriate care could not be provided in the community clinic. The comfort with the ED NP(W) demonstrates the need for any new NP considering a role in community wound care to have advanced wound care education and establish a relationship with community nurses early in developing the role.

### 3.4.1.3 Recommendations for a Community-Based Wound Care Service

Stakeholders suggested requirements for the NP(W)-Led community-based wound care service. The stakeholders' data was condensed, labelled, and grouped into categories of related labels; three themes emerged: *care*, *communication*, and *cost*.

**Care.** Stakeholders indicated that wound care provided in the NP(W)-Led community-based service needed to be evidenced-informed. They felt the NP(W)-Led wound care service should provide multiple services (lab, x-ray, laboratory, pharmacy) during the same visit, reducing the need for nonurgent referrals to the ED. One patient respondent felt that an interdisciplinary team should include dietitians, physiotherapy, pain management, and personal care (foot care, massage, mental health). Many stakeholders requested that the clinic use the same formulary (wound products) as community nurses. All stakeholders suggested that it was essential for the NP(W)-Led wound care service to have a referral process with specific criteria for community nurses and primary care providers. Stakeholders also suggested that it was equally important to allow patients to self-refer. Stakeholders felt that access to laboratory, diagnostics and pharmacy was essential. Additionally, the waiting rooms in the community clinic would need to be handicapped-accessible.

**Communication.** A patient stakeholder thought to enhance communication between the NP(W) and patients using social media platforms and video conferencing. A manager stakeholder requested education provided to the community nurses regarding the NP(W)'s role. This stakeholder stated that "not all [community] nurses are aware that NPs can write orders; they think they are like an ET [enterostomal therapy] nurse who cannot leave orders." Similarly, other stakeholders noted that an algorithm was needed for community nurses to know when to send patients to the NP(W). Some stakeholders were also concerned that physicians might have preconceived ideas about best practice, and as such, not agree with, or be receptive to, the treatment provided by the NP(W).

**Cost.** Stakeholders had concerns regarding the costs, including staffing and supplies, required to operate a community-based clinic. They commented that clinic space needed to be large enough to accommodate patients and skilled wound care providers. Also, transportation costs to the community clinic could be barriers for patients depending on proximity to a bus route. Managers at the LHIN stressed that external funding from the MOHLTC was essential for this service to be sustainable.

### 3.4.2 Step 5: Define the new Model of Care

The information obtained through interviews, focus groups, and questionnaires was reviewed by the NP(W) (QIP lead) and community clinic's manager. This information aided in developing the NP(W)-Led wound care service model of care. The NP(W) would provide wound care to referred patients (see referral criteria below) and a consultative service giving wound care recommendations to community nurses or primary care providers. The NP(W) would send referrals to health care providers and specialists as warranted based on individual case requirements. Patients would be asked to follow-up with the NP(W) if they required additional assessments or treatments within the NP scope of practice.

### 3.4.3 Step 6 & 7: Plan and Initiate Strategies to Implement Role

Management at the local LHIN felt a short pilot would be sufficient to determine the potential for expanding services and infrastructure to incorporate an NP(W). Therefore, it would be challenging to offer all the services suggested by the stakeholders. The community clinic and the local LHIN management determined what recommendations would be feasible for a short trial based on financial constraints and staffing. Strategies to implement the role included a referral process, the community clinic and collaboration.

#### 3.4.3.1 Referral Process

Patient referrals to the clinic were for various reasons, including community nurses wanting assistance dealing with complicated or delayed healing wound cases, or if the patients' wound-related condition required an assessment, consultation or

intervention within the scope of practice of an NP (diagnosis, prescribed medication, diagnostic testing, referrals, or changes to the medical treatment plan). Wound-related conditions were considered conditions related to injury, trauma, infection or the potential to develop into a wound. To initiate the referral, community nurses completed a Medical Update Record (MUR) to provide relevant background information (medical history, wound type, previous, and current treatments) and the reason for the referral (see Appendix F for Medical Update Record). Subsequently, the community nurse would call the local LHIN administrative team to request an appointment. Once the referral was processed, the administrative staff at the local LHIN would fax a daily list of appointments to the NP(W) at the community clinic. The local LHIN communicated the referral process to the community nurses by sending information to their community agencies.

### 3.4.3.2 Community Clinic

The community clinic is an urgent care clinic. As such, the clinic has equipment available to provide intravenous access along with intravenous medication administration. The clinic also had sterilized trays to perform minor treatments such as suturing, biopsy, or debridement. On-site laboratory services (blood tests and cultures), diagnostic services (x-ray and ultrasound), and pharmacy are also available.

To maintain the confidentiality of all patient encounters at the community clinic, the NP(W) had a private examination room. This room contained the essential equipment and supplies (examination table, sink, light, and basic dressing supplies) to assess and treat patients; additionally, the NP(W) had access to a computer, fax machine, telephone and paper supplies from the clinic. The local LHIN provided formulary dressing supplies to stock at the clinic so that the NP could reapply the appropriate product after completion of the assessment/consultation.

Once referred to the clinic, patients received a comprehensive assessment and wound care treatment plan from the NP(W) reflective of evidence-informed practice. Laboratory and diagnostic tests, medications and or prescriptions, and referrals were initiated based

on individual patient assessments. Wound-related or other orders (e.g., personal support worker) were written on the MUR by the NP(W) outlining the community wound care treatments. The NP(W) faxed the wound care orders to the local LIHN's administrative staff to be processed. Referrals were faxed to health care providers as needed. Patients would continue to follow-up with their primary care or specialty providers to manage conditions outside of wound care. Any patient requiring care in the ED was immediately sent by ambulance or car, depending on their condition.

### 3.4.3.3 Collaborative Care

Despite stakeholders' suggestions to include other health care providers, space and staffing costs prevented adding additional personnel to the clinic staff. Referrals were sent to other providers based on individual patient needs, and the patient would incur and cost for these services if they did not have third-party coverage. The health care providers currently employed at the community clinic (physician, pharmacist, nursing staff) were available for consultation or collaboration with the NP(W) as needed. The physician was on-site for consultation regarding diagnostics or treatments outside the scope of an NP.

Utilizing the pharmacy on-site was critical as this allowed immediate administration of the first dose of antibiotics, preventing the need for the patient to be sent to the ED; the pharmacist agreed to stock common intravenous antibiotics on site. Ontario Drug Benefits or the patients' benefit plans covered the cost of medications. Conversely, if the patients had no coverage, they would need to pay out of pocket. During the pilot, clinical outcomes and adverse effects were monitored.

### 3.4.4 Step 8: Evaluate the APN role and new Model of Care

During the implementation of the NP(W)-Led community wound care service, patient outcomes such as patient experience, healing, unexpected results, and adverse events were all measured to evaluate the care provided and determine a need for improvements. The local LHIN will examine the NP(W) practice, including treatments, diagnostics, consultation, and referrals, to determine the feasibility of expanding services and infrastructure at their facility to incorporate an NP(W). Lastly, ED utilization will also be

monitored during the pilot to determine the type and volume of patient visits for wound care.

### 3.4.5 Step 9: Long-term Monitoring of the APN role and Model of Care.

After establishing a permanent NP(W)-Led wound care service, long-term follow-up will be required to monitor the safety and efficacy. Monitoring patient outcomes, including patient experience, healing, discharge from LHIN service, unexpected results, and adverse events, need to be ongoing at regular intervals to evaluate the care provided and determine a need for improvements. The NP(W) practice needs ongoing reviews to ensure that the NP(W) can function to the full scope of practice. Future expansion of services and infrastructure to increase the multidisciplinary team will allow for a collaborative and consultive approach. Regularly monitoring ED utilization and following up with the patients who visited the ED will inform future changes to the NP(W) role and multidisciplinary team.

## 3.5 Discussion

This QIP adds to the current literature regarding the implementation of NP roles using the PEPPA Framework. The PEPPA framework guided the development of an NP(W)-Led community wound care service. The service was developed based on an extensive consultative process with many stakeholders and in consultation with local decision-makers and funders to develop and implement an NP(W)-Led community-based wound care service. Stakeholders provided input regarding the benefits and disadvantages of using the ED for wound care and suggestions for a community-based wound care service.

A strength of this QIP is the total number and a wide range of health care personnel stakeholders who provided feedback. The QIP is unique because it provides information regarding the development and implementation of an NP(W)-Led community-based wound care service, a collaborative effort between the local LHIN and a community



clinic. Additionally, the NP(W) having post-graduate advanced wound care knowledge helped get buy-in from community health care providers.

The stakeholders' view that the ED is not the appropriate place to provide nonurgent wound care is congruent with literature that examined care received in EDs in Canada. Most notably, patients should not receive treatment in EDs for nonurgent complaints<sup>19</sup> as there are long wait times and difficulties with access to care.<sup>19-22</sup> Interestingly, in this QIP, the patient participants did not comment on the wait, the cost for parking, or transportation issues.

Content analysis was the technique used to assess the data. An advantage of content analysis is that it enables data organization into categories, allowing patterns to emerge that are not obvious from listening to recordings or reviewing transcripts.<sup>14</sup> A disadvantage of content analysis is the researcher must be aware of their understanding of the topic to avoid creating an interview or observer bias that may influence results.<sup>18</sup> To reduce this bias's potential, a research assistant performed an audit trail to review the transcript and verify categories.

Literature in Canada related to NP-Led clinics providing and coordinating primary health care demonstrates that NPs provide comprehensive care, including health promotion, disease prevention and chronic disease management.<sup>23</sup> International literature demonstrates that NPs coordinate wound care by making interdisciplinary referrals to community nurses, foot care specialists, allied health<sup>24</sup> podiatrists, orthotists, physiotherapists<sup>25</sup> and specialists.<sup>24</sup> The provision of evidence-informed wound care requires an interdisciplinary team to manage wounds and prevent recurrences.<sup>26</sup>

NP educational programs prepare entry-level graduates; however, the provision of advanced wound care modalities and ordering advanced treatments often depends on the NP's comfort level, skill, and knowledge. Additionally, attempting to provide advanced wound care requires equipment and expensive dressing supplies not commonly found in primary care settings. Continual advances in health care necessitate advanced training and certification in specialized fields such as wound care. Specialized NP roles in neonatology, nephrology, and cardiology, established in Quebec (Canada), required the

NP to have advanced training in addition to the requirements of their initial NP graduate master's degree.<sup>8</sup> Currently, the College of Nurses of Ontario recognizes the following specialty certificates: NP–Primary Health Care (NP-PHC); NP–Pediatrics; or NP–Adult .<sup>4</sup>

### 3.6 Limitations

This QIP has several limitations. A limitation of the QIP was not using all the stakeholders' suggestions to develop and implement the NP(W)-Led wound care service. Input from stakeholders was considered, but ultimately leadership at the local LHIN and the community clinic decided the referral process and resource allocation. The short pilot lasting only three months may have also limited the participation of some community nurses and patients who were seeking a more permanent solution for their chronic wound care needs. A longer or permanent service may get additional participation from community nurses and patients who elected not to use the service. Also, a funded service could incorporate all stakeholders' suggestions.

The NP(W) was the researcher, interviewer, and provider of care in the wound care service, potentially creating bias. For instance, a social desirability bias may have been created with the LHIN respondents as they may have felt a need to answer positively in order for their patients to receive adequate care from the NP(W).<sup>27</sup> Likewise, patient stakeholders may have wanted to respond positively to ensure receiving care in the future.

The potential for social desirability bias also existed since the NP(W) conducting the interviews was the same NP(W) who worked in the ED and led the NP(W)-Led wound care service development and implementation. Due to this, participants may or may not answer truthfully based on the NP(W)'s presence in the room. To mitigate these potential biases, the NP(W) remained aware of her body language and maintained a neutral tone when asking questions in the focus groups. Participants were also offered the option to anonymously fill out a questionnaire instead of being in a focus group.

To prevent the researcher from creating a confirmation bias by interpreting the data to confirm their ideas or beliefs, a research assistant conducted an audit trail via transcript

review and verified categories to confirm the study's findings. Future studies must use an interviewer who is not involved in direct care or developing the service to conduct interviews and condense transcripts.

The low number of patients who participated in the QIP limits interpretation and generalizability of the results. Future studies should endeavour to include more patients to provide valuable insight into the patient perspective. A future qualitative study would provide an enlightening analysis of stakeholder input.

### 3.7 Conclusion

Engaging key stakeholders using the PEPPA Framework determined local interest in implementing a service for people seeking community-based wound care. An NP(W)-Led wound care service was developed by incorporating stakeholder feedback, including potential team members, treatment, and referral processes. An evaluation process would determine patient satisfaction with the NP(W)-Led wound care service and note any reduction in nonurgent ED visits for people receiving wound care services through the local LHIN.

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## Chapter 4

### 4 Exploration of a Nurse Practitioner Led Community Wound Care Service

The Ministry of Health and Long-Term Care (MOHLTC) and the Local Health Integration Networks (LHIN), a ministry-funded agency, continually make changes that impact the delivery of health care services throughout Ontario (Canada). Both aim to improve access, integrate services, adopt evidence-based care, and reduce emergency department (ED) use.<sup>1,2</sup> Health Quality Ontario (HQP) is an agency that advises the MOHLTC by finding gaps and providing recommendations on issues related to health care. HQP determined that there are gaps in the access and provision of wound care services across Ontario.<sup>3</sup>

The high cost of providing wound care impacts universal delivery. The total cost of providing wound care is challenging to estimate, as both direct and indirect costs are difficult to quantify. Based on projections from 2012, the estimated annual cost of wound care in Canada may exceed 5 billion dollars by the end of 2020.<sup>4</sup> LHINs currently allocate \$5.9 billion annually to community programs across Ontario.<sup>5</sup> The exact amount for wound care is unknown, but direct costs are estimated to be over \$1 billion annually.<sup>6</sup> Furthermore, there are additional indirect costs; 65% of patients with chronic wounds suffer from decreased mobility, pain, depression, anxiety, and an overall decrease in their quality of life.<sup>7</sup>

The high cost of wound care and the gaps in access and provision of services across Ontario warrant utilizing alternate care models to deliver wound care across the province, particularly in one city in Southwestern Ontario. In this region, patients frequently visit the ED for complaints related to wound care; from January to April 2016, more than 1000 patients registered with wound-related issues in the local ED<sup>8</sup> (specific complaints not available). A quality improvement project (QIP) was undertaken to develop a nurse practitioner (NP) led community-based wound service. The QIP was a collaboration between the local LHIN and a community clinic. Stakeholder feedback from the local



LHIN, the community clinic, and the ED provided information to develop and implement the service. This study explored the NP(W)-Led community wound care service.

## 4.1 Background

Restructuring of the hospitals in this city is in the initial stages. Currently, two hospitals are merging into one mega-hospital. The two existing hospitals developed a restructuring proposal called Phase 1-Community Capacity Plan<sup>9</sup> to guide restructuring. The proposal was developed by the Program and Planning Steering Committee in collaboration with health care planners, quantitative data experts, and the Hay Group (strategic advisors for service delivery models). A goal of the Community Capacity Plan was to improve service integration between acute and community care.<sup>9</sup> The proposal suggested that hospital planners consider implementing an NP Wound Management Clinic within the new hospital, as a hospital satellite facility or as an outpatient community facility, to improve community services coordination. The proposal's suggestions demonstrated readiness in this region to utilize NPs to link hospital and community services.

The local LHIN director of patient services wanted to improve wound care services in the community and reduce ED wound-related visits for the approximately 1000 patients registered annually through the local LHIN for wound care. Hence, they agreed to partner with an NP and a local community clinic to pilot an NP-Led community wound care service. This project aligned with the MOHLTC and provincial LHIN objectives<sup>1, 2</sup> and supported the Community Capacity Plan's suggestions.<sup>9</sup> Specifically, the project met local LHIN objectives of providing timely access to care while coordinating and improving community care and reducing ED visits for chronic disease management.<sup>10</sup> Using an NP-Led model of care may reduce ED visits for wound care and link acute and community care.

### 4.1.1 Nurse Practitioner

In Ontario, an NP is a registered nurse (RN) who subsequently completes a graduate-level NP educational program, and upon completion, passes a provincial exam. Once successful, candidates are permitted to use the protected title of NP or RN Extended

Class (RN(EC)). The College of Nurses of Ontario outlines the standards of practice and controlled acts authorized to NPs to support an advanced practice scope. An advanced scope offers opportunities for NPs to coordinate and provide advanced wound care. Controlled acts that facilitate wound care include: establishing diagnoses, treating conditions, ordering and interpreting diagnostic tests, prescribing medications, and making referrals to specialists.<sup>11</sup> NPs can also provide leadership by coordinating services from acute to community care and can function as consultants, educators, and researchers.<sup>12</sup> Additionally, NPs practice collaboratively with other health care professionals.

Graduate-level NP program education includes wound management. Unfortunately, there may be limited opportunities for hands-on clinical experience providing and directing wound care. As such, NPs interested in practicing in an advanced wound care role may obtain additional post-graduate education specific to wound management. An NP with post-graduate wound care education (NP(W)) can help fill gaps in services and provide community-based evidence-informed wound care.

#### 4.1.2 Nurse Practitioner Led Community Wound Care Service

Given the local LHIN and a community clinic's willingness to explore an alternative care model, an NP(W)-Led community wound care service was developed and implemented. It was a 12-week pilot, with wound care services offered twice weekly from June 12, 2017, until August 31, 2017. A community-based urgent care clinic was selected as the site for the NP(W)-Led wound care service site as it had supplies, personnel, and onsite facilities, enabling the NP(W) to work to their full scope of practice. The director of patient services for the local LHIN sent out information to community agencies to advertise the NP(W)-Led wound care services and stipulated the inclusion criteria. The director informed the community agencies that their nurses could contact the local LHIN to refer patients who had wounds for an assessment or consultation within the NP scope of practice. The NP(W) included comprehensive assessments, evidence-informed treatments, diagnostic and laboratory testing, and referrals to specialists as warranted.

Additionally, the NP(W) treatment orders facilitated community wound care through the local LHIN.

## 4.2 Objectives

This prospective study explored the NP(W)-Led community-based wound care service. Specific research objectives for this study included:

1. To describe the NP(W) wound care practices (treatments, diagnostics, consultations, and referrals) in the wound care service.
2. To summarize clinical outcomes and report any unexpected results or adverse events in patients receiving care through the NP(W)-Led wound care service.

## 4.3 Methods

### 4.3.1 Study Approval

Study approval was through one University Research Ethics Board (REB) (REB #108999). A second university reviewed and approved the ethics submission (REB# 18-074) (see Appendix A for REB approvals). The local LHIN and the community clinic provided letters of support (see Appendix B for Agency Support Letters).

### 4.3.2 Sampling/Recruitment

The study population included patients receiving community wound management through the local LHIN and associated provider agencies in an urban centre located in Southwestern Ontario. Nurses in the community recruited patients from the population of interest for the study. All patients who met the NP(W)-Led wound care service's inclusion criteria were encouraged to participate in the 12-week pilot research study. The service was available twice weekly between June 12 and August 31, 2017. Community nurses recruited patients who had wounds or wound-related conditions requiring consultation, assessment, or interventions within the NP scope of practice.

The community nurse contacted the local LHIN administrative staff to schedule an appointment with the community clinic; the patient's Medical Update Record (MUR) (see Appendix F) was faxed to the clinic or provided by the patient on arrival. The MUR provided relevant background information (medical history, wound type, previous and current treatments) and the reason for the referral. Additionally, patients could self-refer by calling the local LHIN to make an appointment. Physicians at the community clinic could also refer patients who met the inclusion criteria.

### 4.3.3 Inclusion/Exclusion Criteria

Inclusion criteria included persons: 1) 18 years or older, 2) registered to receive wound care through the local LHIN, 3) with an acute or chronic wound (diabetic foot ulcer, venous leg ulcer, arterial leg ulcer, pressure injury, or another wound-related concern, and 4) required care within the scope of practice of an NP.

Exclusion criteria included persons: 1) required urgent care in the ED or required hospital admission, 2) unable to communicate in English (read and understand) without a translator or substitute decision-maker, and 3) had mobility issues which prevented them from attending the community clinic.

### 4.3.4 Consent

All patients referred to the NP(W)-Led wound care service received a letter of information from the administrative staff when they arrived at the community clinic. The Letter of Information outlined the study's purpose, inclusion and exclusion criteria, procedures, consent, possible risks and harms, benefits, compensation, voluntary participation, confidentiality, data storage and destruction, contacts for further information, and the potential for publication of the findings (see Appendix G). Patients read the letter of information, and the NP(W) answered any questions before obtaining written consent and before providing any wound care services.

## 4.4 Study Setting

The NP(W) wound care service was a coordinated effort between the local LHIN and a community clinic located in Southwestern Ontario. The community clinic selected for the 12-week pilot was an established urgent care centre that offered some minor services typically performed in an ED. The clinic initiated intravenous access for medication or fluid administration, and they had sterilized trays to perform minor treatments. If necessary, the clinic had the equipment to provide cardiac monitoring, resuscitation and stabilization until emergency services arrive.

The community clinic provided the NP(W) with access to administrative and nursing staff, a private examination room, a computer, a fax machine, and a telephone. The facility also had an onsite laboratory, diagnostic, and pharmacy services, and a physician and pharmacist were available onsite for consultation or collaboration as needed. The available equipment, multiple services, and collaborative team at this community clinic facilitated the NP(W) to practice to their full scope. Having access to a pharmacy enabled the immediate administration of the first dose of antibiotics. To ensure consistency, the local LHIN provided dressing supplies that matched the formulary used in the community.

## 4.5 Standard Care

All participants in this study received standard care from one NP(W). This person was also the primary investigator of the research study, performed wound assessments, recommended treatments, conducted all data analysis, and was the author of this thesis. A second NP, who had previously done a clinical mentorship in wound care, assisted the NP(W) for one week of the 12-week pilot. Participants included in the study who were assessed and treated by the second NP were previously or subsequently seen by the NP(W).

The NP(W)'s wound care consisted of a comprehensive assessment, including documentation of medical conditions and factors that affected healing. Treatments were based on a comprehensive assessment using evidence-informed guidelines, including care

of people with diabetes,<sup>13</sup> venous leg ulcers,<sup>14</sup> arterial ulcers,<sup>15</sup> pressure injuries,<sup>16</sup> pain,<sup>17</sup> and wound infections.<sup>18</sup> Practice guidelines were followed based on the patient's or facility's monetary restraints; there was no provision by the clinic for offloading devices or compression stockings.

Wounds that demonstrated an external break in the epidermis beyond a superficial erosion were considered measurable. Initial and subsequent wound measurements involved measuring wound surface area, determined by multiplying the longest length (head-to-toe) with the longest perpendicular width (side-to-side). There is no standardized method used for wound measurement, and the ruler technique is a convenient and straightforward method that does not require additional institutional resources.<sup>19</sup> Wound healing outcomes were expressed as the change between initial and final wound measurement, with the final measurement taken at 12 weeks or at discharge, if before 12-weeks. Dressing selection for wounds reflected the local LHIN formulary.

Laboratory and diagnostic tests were ordered based on participants' needs, and any consultation or collaboration occurred with the onsite physician or the pharmacist when deemed necessary by the NP(W). Any participants who required treatment in the ED were sent via ambulance or car, as they would if they sought care in any community clinic. Part of the NP(W) service was to promote ongoing, consistent care. As such, between NP(W) visits, patients continued to receive community-based wound care through the local LHIN. Initially, the NP(W) evaluated the patient treatment plan and made additions or changes to community-based wound care as needed; requests were sent through the local LHIN to involve interdisciplinary team members. Interventions were specific to wound care, and patients continued to follow-up with their primary care provider to manage any other health conditions.

## 4.6 Data Analysis

A research assistant entered all data from the NP(W)-Led clinic into an excel spreadsheet which was imported into the IBM Statistical Package for the Social Sciences (SPSS) version 26 for data analysis. Due to the study's exploratory nature and the objectives to

describe practices and outcomes, inferential statistics were not analyzed. Descriptive statistics provided a summary of the data by examining frequency, central tendency, and dispersion. Before analysis, the dataset was assessed for missing data. One patient had 0.9% missing data across multiple variables as they were referred to the ED before completing their assessment. The participant's datum was kept in the analysis to report on their descriptive statistics. Descriptive statistics (frequency, proportion, mean, SD) described participants' demographics, diagnoses, and duration of wounds. Additionally, descriptive statistics described the NP(W) wound care practice and the change in wound size (surface areas) at 12 weeks or discharge (initial and final measurement).

## 4.7 Results

All patients presenting to the NP(W)-Led wound care service between June 12 and August 31, 2017, agreed to participate in the study. There were 112 participants, many with multiple visits ( $n= 217$ ), to the NP(W)-Led community wound care service. Participants ranged from 25–99 years. Most participants were between the ages of 60-79 years (43%), with the mean age being 66 years ( $SD = 16.31$ ). Most participants were male (58%) and married (52%) (see Table 1). Participants continued to have follow-up appointments with the NP(W) until they resolved their complaint, completed the 12-week pilot study, or no longer required care within the NP(W) scope of practice. Total visits ranged per participant from 1-11, with the average being two. More than half the participants had one visit ( $n=59, 52.7\%$ ), another 33 (29.5%) had two visits, and 10 (9%) had three visits. The remaining 10 participants (9%) had four or more visits.

**Table 1**

*Demographics of Participants in NP(W)-Led Wound Care Service*

<i>Variable</i>	<i>n*</i>	<i>%</i>
Sex		
Male	65	58.0
Female	47	42.0
Age (years)		
18-39	5	4.5
40-59	33	29.5
60-79	43	38.4
80-99	31	27.7

Variable	n*	%
Marital Status		
Common law	3	2.7
Divorced	6	5.4
Married	58	51.8
Separated	3	2.7
Single	24	21.4
Widowed	18	16.1
Total	112	100

\*n=total participants (112)

Study participants with various diagnoses received assessment and treatment through the NP(W)-Led wound care service. The three most common diagnoses were diabetic foot ulcers ( $n=24$ , 21.4%), venous leg ulcers ( $n=19$ , 17%), and venous stasis dermatitis ( $n=18$ , 16%) (see Table 2).

**Table 2**

*Diagnoses in the NP(W)-Led Wound Care Service*

Diagnosis	n*	%
Diabetic foot ulcer	24	21.4
Venous leg ulcer	19	17.0
Venous stasis dermatitis	18	16.1
Cellulitis	9	8.0
Avulsion	5	4.5
Ingrown toenail	5	4.5
Pressure injury	5	4.5
Osteomyelitis	4	3.6
Abscess	3	2.7
Arterial ulcer	3	2.7
Cancer-radiation injury/squamous cell	3	2.7
Postop wound	3	2.7
Actinic keratosis	1	0.9
Arterial disease- amputation	1	0.9
Biopsy site drainage-lymphedema	1	0.9
Gout	1	0.9
Hematoma	1	0.9
Laceration	1	0.9
Lymphedema	1	0.9
Mixed ulcer (arterial/venous)	1	0.9
Neuropathic ulcer	1	0.9
Pyoderma gangrenosum	1	0.9
Sebaceous cyst	1	0.9
Total	112	100

\*n= participants



Study participants reported having their wound or wound-related condition less than one month to greater than 60 months. The average duration of the presenting condition was 2.5 months. Most participants reported having their wound/condition between two-six months ( $n=38$ , 33.9%). One participant was unsure of the length of time they had their wound (see Table 3).

**Table 3**

*Duration of Wound per Diagnosis in the NP(W)-Led Wound Care Service*

Diagnosis	Duration of Wound (months)				
	<1-2	>2-6	>6--12	>12-24	>24
Diabetic foot ulcer	8	8	2	2	4
Venous leg ulcer	3	7	1	3	5
Venous stasis dermatitis	4	8	1	1	4
Cellulitis	5	1	2	1	0
Avulsion	5	0	0	0	0
Ingrown toenail	3	1	0	1	0
Pressure injury	1	2	0	0	2
Osteomyelitis	1	1	0	1	0
Abscess	0	2	0	0	1
Arterial ulcer	0	3	0	0	0
Cancer-radiation injury/squamous cell	0	0	0	1	2
Postop wound	1	2	0	0	0
Actinic keratosis	0	0	0	1	0
Arterial disease- amputation	1	0	0	0	0
Biopsy site drainage-lymphedema	0	0	0	0	1
Gout	0	1	0	0	0
Hematoma	0	1	0	0	0
Laceration	1	0	0	0	0
Lymphedema	0	0	1	0	0
Mixed ulcer (arterial/venous)*	0	0	0	0	0
Neuropathic ulcer	0	1	0	0	0
Pyoderma gangrenosum	0	0	0	1	0
Sebaceous cyst	1	0	0	0	0
Total	34	38	7	1	19

\*mixed ulcer-unknown length of time

Many of the participants treated in the NP(W)-Led wound care service did not have measurable wounds during their assessment. Fifty-nine participants (52.7%) had one visit and a single wound measurement, another 27(24%) had multiple visits with multiple wound measurements. A change in wound measurement was calculated for 27 participants from the initial to final measurement; four (14.8%) no longer had a

measurable wound, 11 (40.7%) decreased in size, three (11%) had no change, and nine (33.3%) had an increase in the size of their wound (see Table 4).

**Table 4**

*Wound Measurement-NP(W)-Led Wound Care Service*

*Difference between Initial & Final (cm<sup>2</sup>= length x width)*

Diagnosis		Initial measurement	Final measurement	Difference in measurement*
Two visits	Arterial ulcer	4.00	.00	4
	Cancer	45.00	.00	45
	Diabetic foot ulcer	.50	.00	.50
	Diabetic foot ulcer	1	1	no change
	Diabetic foot ulcer	25.00	9.00	16.00
	Diabetic foot ulcer	35.00	35.00	no change
	Diabetic foot ulcer	.50	1.00	-.50
	Diabetic foot ulcer	.25	1.13	-.88
	Diabetic foot ulcer	6.00	1.77	4.23
	Neuropathic ulcer	.00	.25	-.25
	Osteomyelitis	.50	.50	no change
	Pressure injury	.00	5.25	-5.25
	Pressure injury	.00	1.00	-1.00
	Venous leg ulcer	.00	38.00	-38.00
	Venous leg ulcer	15.00	3.00	12.00
Venous leg ulcer	6.50	4.75	1.75	
≥ three visits	Diabetic foot ulcer	5.00	.00	5.00
	Diabetic foot ulcer	3.00	.50	2.50
	Diabetic foot ulcer	5.00	2.00	3.00
	Venous leg ulcer	27.00	.20	26.80
	Venous leg ulcer	14.00	10.50	3.50
	Venous leg ulcer	29.00	42.50	-13.50
	Osteomyelitis	8.00	2.50	5.50
	Pyoderma gangrenosum	25.00	30.00	-5.00
	Diabetic foot ulcer	2.00	7.50	-5.50
	Venous leg ulcer	119.00	47.25	71.75
	Actinic keratosis	896.00	572.00	324.00

\*Note- negative number represents an increase in wound size

#### 4.7.1 NP(W) Practice in the Wound Care Service

One hundred twelve participants received care through the NP(W)-Led wound care service. Twenty-five (22.3%) had single or multiple laboratory tests, including 21 wound cultures (18.8%) and five blood tests (4.5%) consisting of CBC (complete blood count), SMR (blood chemistry), and medication trough levels (serum drug level). Twelve

participants (10.7%) had diagnostic tests ordered. The NP(W) ordered a foot x-ray for one participant (0.9%) to determine if previously diagnosed cellulitis (by another health care provider) was an early presentation of a Charcot foot deformity. The other 11 diagnostic tests (11, 9.8%) were nuclear med (bone scans) and ultrasounds, both required consultation with a physician as NPs were not authorized to order either test at the time of this study. Seven participants required a bone scan to rule out osteomyelitis, and four others required ultrasounds to rule out either an abscess or deep vein thrombosis.

Fifty-nine participants (52.7%) had treatments consisting of initiation or continuation of compression ( $n=41$ , 36.6%), conservative sharp wound debridement ( $n=14$ , 12.5%) and assessment/removal of peripherally inserted central catheters ( $n=4$ , 3.6%). Compression levels ranged from 8 mmHg to 40 mmHg, depending on the product (Tubigrip, Coban Lite, Coban, Juxtalite). Eighty-seven participants had wounds requiring impregnated or antimicrobial products; others required only external dressings for scaling, fissures, or erosions. Dressing selection reflected the assessment completed at each visit, formulary, dressing change frequency, and patient preference. Products for external dressings included gauze, foam, alginate, hydrogel, hydrocolloid, or silicone products on the local LHIN formulary. Impregnated/antimicrobial wound care products were selected based on wound assessment, cultures, formulary, change frequency, and patient preference. Products were changed based on wound changes at subsequent assessments. Iodine products were the most frequently used product (See Table 5).

**Table 5**

*Products used in the NP(W)-Led Wound Care Service*

Product	<i>n</i> *	%*
zinc	7	6.3
iodine	45	40.2
silver	12	10.7
other	7	6.3
multiple products	16	14.3
Total	87	77.7

\* $n$ =participants

Twenty-eight participants (24.1%) received referrals, with one having multiple. The most frequent referral was to an orthotist or pedorthist ( $n=13,12$ , 11.7%) for participants with diabetic foot ulcers to receive offloading of high-pressure areas. Eight (7.1%) referrals

were for physicians specializing in vascular, orthopedic, or infectious diseases. There were referrals for advanced foot care (chiroprody or certified foot specialist) sent for five participants (4.5%). Additional referrals ( $n=4$ , 3.6%) included a personal support worker, physiotherapist, and massage therapy. Consultation was requested with the onsite physician for 14 participants. As previously stated, 11 were for diagnostic tests the NP(W) could not order. The other three were requests from the patients to see a physician.

Seventy-seven participants were prescribed medications (68.8%) (see Table 6). Seventeen (15.2%) participants had multiple medications ordered. Oral antibiotics were ordered most often ( $n=42$ , 37.5%). Multiple medications included any combination of oral progressing to intravenous antibiotics, analgesics, and topical medications. Antibiotics were ordered or continued for clients with overt clinical signs of infection (erythema, local warmth, swelling, purulent discharge, delayed wound healing, new/increasing pain, malodour).<sup>20</sup> Antibiotic selection was empirical or based on the culture and sensitivity results. There were nine analgesic prescriptions written (8.1%), with most listed under multiple medications.

**Table 6**

*Medications Prescribed in the NP(W)-Led Wound Care Service*

Medication	<i>n</i> *	%
analgesic	1	.9
intravenous antibiotics	16	14.3
oral antibiotic	42	37.5
multiple medications	17	15.2
topical medication	1	.9
Total	77	68.8

\* $n$ =participants

Sixteen participants (14.3%) were discharged from the local LHIN services as they no longer required treatment; the remainder continued with community wound care. Two participants were sent to the ED. One to receive an intravenous antibiotic that was only covered by the insurance carrier if administered in an ED. The second was for an assessment and possible admission because of copious malodourous drainage and a coexisting diagnosis of osteomyelitis.

There were unexpected findings in this study. Several instances occurred where established best practices<sup>14</sup> available in the community were not in place for study participants with chronic wounds. For example, the NP(W) initiated compression for people with venous leg ulcers and callus paring for participants with diabetic foot ulcers. Additionally, three patients requested to be assessed by the consulting physician. The physician had not taken any advanced wound care education, and after assessing the patient, they did not make any changes to the treatment plan.

## 4.8 Discussion

This 12-week pilot explored an NP(W)-Led community wound care service implemented in an urban city in Southwestern Ontario. The study examined patient characteristics, described assessment and treatments provided by an NP(W), and reported clinical outcomes and adverse events. This study's strength is that it provides new information regarding an NP(W)-Led wound care service. It is unique because it one of the only collaborative projects between the local LHIN and a community clinic in this region.

Examining the NP(W) practice in this study provides information to aid future NP(W) role development. The types of wounds observed, along with the treatments provided and diagnostic tests ordered in this study, are comparable to other international studies done regarding NP practice and wound care.<sup>22-24</sup> Similar to this study, international studies reported that NPs treated various wound types, including leg ulcers, diabetic foot ulcers, pressure injuries, infected wounds, and surgical wounds.<sup>22-24</sup> As well, NPs in other studies provided education, performed sharp debridement,<sup>22-24</sup> completed comprehensive assessments,<sup>24</sup> and ordered compression therapy.<sup>23,24</sup> Additionally, NPs ordered similar diagnostic (x-rays)<sup>23</sup> and laboratory tests (chemistry analysis, CBC, and wound cultures),<sup>23</sup> and have similar referrals to interprofessional health care providers (community nurses, foot care, allied health<sup>22</sup> podiatrists, orthotists, and physiotherapists<sup>23</sup>), and specialists,<sup>22</sup> including vascular<sup>24</sup> or infectious diseases consultants.<sup>23,24</sup> Medications ordered were also similar, including topical corticosteroids,<sup>22,23</sup> topical antimicrobials,<sup>23</sup> antibiotics,<sup>22-24</sup> and narcotic oral analgesics (codeine).<sup>23</sup>

Participants in this study received evidenced-informed wound care from a qualified provider. However, three participants requested to be assessed by the physician working in the clinic. The physician did not have any advanced wound care education, and after assessing the participant, did not make any changes to the treatment plan. It seemed that these participants expected the plan of care to be physician-driven. A study conducted by Stahlke et al.<sup>21</sup> reported similar findings. They interviewed nine patients to gain a patient perspective on NP-Led care in a breast cancer outpatient clinic. Participants initially indicated feeling dismissed because they were not seeing a doctor and unsure of the care they would receive from a “nurse,” feeling the care to be “second-tier.” Additionally, participants felt the physician was in charge, and the NP was working in their clinic. The idea of hierarchical health care providers needs further examination if the expectation is for patients to receive wound care from the most qualified member of the interprofessional team, especially if that provider is not a physician.

Established best practices available in the community were not in place for some of the study participants. Data from this study suggest that challenges exist, and more work needs to be done to improve the provision of best practices in wound care and patient outcomes in Ontario. Not surprisingly, many participants diagnosed with diabetic foot ulcers did not have any offloading for high-pressure areas; thus, the most frequent referrals were for offloading. Unfortunately, these participants frequently declined referrals for offloading and foot care if they had no third-party benefit coverage. In Ontario, offloading devices (removable, non-removable, total contact foot casts) are available at no cost to eligible patients, and the local LHIN provides this service. As such, the NP(W) requested multiple assessments for eligibility.

Guidelines for wound care stress that an interprofessional team is essential to provide comprehensive wound care. Canada has universal health care; however, interprofessional teams’ lack of funding seems to suggest otherwise. In this pilot study, it was not feasible to employ additional health care professionals. As such, there were referrals sent and prescriptions provided if participants had third-party coverage.

There were no adverse effects for any of the patients in the study. Most patients in this study received nonurgent wound care from the NP(W). These findings suggest that nonurgent patients could receive comprehensive wound care in an alternate community setting outside the ED. Two participants were sent to the ED. One was considered urgent, and the other required an intravenous antibiotic that was only covered if administered in an ED. The lack of funding for all medication needs addressing so patients can receive community care and prevent patients with nonurgent concerns from being sent to the ED.

## 4.9 Limitations

There are several limitations to this study. The study took place in one locality of Southwestern Ontario, limiting the generalizability of the results. There were several biases created. Convenience sampling was used (patients available to community nurses), which does not randomize participants from the general population, and as a result, causes sampling bias, making generalization difficult. Social desirability bias was a concern for participants as the NP(W) was the lead researcher, wound care provider, and obtaining consent. Participants may have wanted to support the NP to ensure future care.<sup>25</sup> Participants were instructed they would receive care even if they did not consent to the study, to reduce social desirability bias.

Another limitation of the study was the 12-week pilot. There may have been a reluctance to attend based on the brief period. Also, not establishing strict criteria to assess wound healing over time. Participants who did not require care within the NP(W) scope of practice continued with community care and were not rescheduled in the NP(W)-Led wound care service. As a result, most participants had only one visit with the NP(W). The single visits and the short pilot resulted in limited information about important clinical outcomes, such as healing, making it impossible to compare with healing reported in the literature.

## 4.10 Implications for Practice

This study provides information useful for NPs and community agencies looking to implement NP(W)-Led wound care services. Most patients in this study did not require

any laboratory tests. Therefore, it is convenient, but not essential, to have a laboratory within the same building. It is more important that a laboratory provide same-day results for tests such as therapeutic blood levels to allow same-day changes in medications. Same-day results are necessary when attempting to adjust the dosage of intravenous antibiotic medications based on therapeutic blood levels as it is common practice in this region for patients to be sent to the ED when they require same-day laboratory results.

Having diagnostic capability nearby would help facilitate ultrasounds, x-rays, and troubleshooting of peripherally inserted central catheter. When planning the resources required for an NP-Led wound clinic, it would be beneficial to have a pharmacy located within or adjacent to the clinic to administer intravenous antibiotics to avoid treatment delays. Having a pharmacy onsite eliminates the need to send patients to the ED for their first dose, typical in this region. Providing the first dose of government-funded antibiotics in the community is crucial in reducing nonurgent ED visits.

#### 4.11 Future Studies

Repeating a well-designed, longer study with a larger sample size may produce different results and provide additional information. Future research should include a prospective controlled trial that is long enough to expect healing. Patients need to be randomized to a treatment group (NP(W)-Led) with a comparison group receiving usual care through the local LHIN. Clinical outcomes could include healing rates and discharge from LHIN service. Additionally, data analysis was quantitative; a qualitative perspective would provide the patient's perspective receiving wound care from an NP(W).

#### 4.12 Conclusion

This study provides information regarding an NP(W)-Led wound care service by examining patient characteristics, NP(W) wound care practice, and outcomes. This short pilot study took place in only one locality in Southwestern Ontario. However, concerns related to ED and wound care services, in general, are issues throughout Ontario and Canada.



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## Chapter 5

### 5 Patient Experience Receiving Wound Care from a Nurse Practitioner in a Community Clinic

Evaluating patient experiences allows us to collect valuable information regarding the delivery of health care services. Measuring the total experience allows us to examine how patients are treated and the environment care is provided, rather than just satisfaction with one provider or a single service.<sup>1,2</sup> Information gathered from examining the total patient experience provides context to develop benchmarking for future comparisons,<sup>3</sup> promotes accountability,<sup>4</sup> and emphasizes vital areas for improvement.<sup>5</sup> Accordingly, agencies throughout Ontario (Canada) place a high priority on improving patient experiences.

Questionnaires are an ideal way to evaluate patient experiences to ensure that the future of health care remains patient centered. Nurse Practitioners (NP) can use the information gathered from surveys and questionnaires to gain insight into patients' experiences. Examining patient experiences will provide essential information to guide and improve the current and future practice of NPs.

#### 25.1 Background

In Canada, there is a universal health care system. Canadian citizens or permanent residents can apply for public health insurance in their home province. Public health insurance covers most health care services in Canada, including services rendered by a physician or NP.<sup>6</sup> Consequently, patient experience has become a focus for the Ministry of Health and Long-term Care (MOHLTC),<sup>7</sup> Local Health Integration Networks (LHIN),<sup>6</sup> and the provincial advising agency, Health Quality Ontario (HQP).<sup>1</sup>

The MOHLTC seeks to enhance patient experiences by improving access to care, integrating community services, improving patients' health and wellness, and maintaining the system's quality and sustainability.<sup>7</sup> In Ontario, fourteen publicly funded LHINs provide patients with home and community services. The LHINs seek to improve

patient experiences by coordinating care for high users of health care resources, adopting evidence-informed care, and implementing changes to reduce the reliance on emergency departments (ED) for chronic disease management.<sup>8</sup> Further, HQO provides recommendations related to the provision of quality health care. HQO, along with community experts, recommends improving patient experiences by addressing Ontario's variability regarding patient access to wound care services.<sup>10</sup> Using alternative models of care can help address variability and access issues for community wound care. NPs can adopt the mandates of MOHLTC, LHIN, and HQO and enhance patient services by providing community-based wound care.

### 25.1.1 Nurse Practitioners

To become an NP in Ontario, a registered nurse (RN) with a four-year undergraduate nursing degree must take additional graduate-level education and pass a provincial exam. Once licensed, NPs follow the *Practice Standard Nurse Practitioner*<sup>11</sup> developed by the College of Nurses of Ontario (CNO). The *Standard* defines controlled acts that are authorized to NPs, providing them with an advanced scope of practice. The CNO authorizes eight controlled acts allowing NPs to independently provide various treatments, establish and communicate diagnoses, order and interpret diagnostic tests, and prescribe medications (including controlled substances).<sup>11</sup> These controlled acts enable NPs to provide advanced wound care. The CNO also expects NPs to have a consultative and collaborative practice with other health care professionals and service providers.<sup>11</sup>

The Ontario Primary Health Care Nurse Practitioner Program provides education related to managing acute and chronic wounds. Unfortunately, hands-on experience may be limited in clinical placement sites based on the preceptor's knowledge and comfort level providing advanced wound care. As a result, graduate NPs may lack the advanced wound care expertise essential when providing or directing advanced wound care. As a result, NPs may seek additional advanced wound care education through post-graduate programs to provide additional theoretical and clinical. An NP with post-graduate wound care education NP(W) can provide or direct evidence-informed wound care.

## 25.1.2 Patient Experience with Nurse Practitioners

Literature published in Canada evaluated patient experiences with health care services delivered by NPs in primary care, hospital, and rural settings.<sup>12-18</sup> The Sudbury primary care NP-Led Clinic, the first NP-Led model of care established in Ontario, was evaluated in 2009, two years after opening, and again two years later in 2011. The initial study was conducted for the MOHLTC to evaluate the NP-Led care model before establishing additional clinics across Ontario.<sup>12</sup>

The MOHLTC study evaluated patient experience with the NP-Led model through mailed surveys and focus groups. A mailed survey was sent to 970 randomly selected clinic patients with 603 surveys returned, a response rate of 62%. Participant age ranged from 16-93 years. Eighty-seven percent of participants indicated satisfaction with the care received from NPs and reported a shorter wait time to see an NP than their previous experience with a physician. Interprofessional access was reported as easy, as a physician and pharmacist were available onsite for consultation or collaboration.<sup>12</sup> Additionally, 20 patients signed up to participate in audiotaped focus group interviews. Participants in the focus group expressed satisfaction with the listening skills of NPs, and their caring, friendly, and respectful approach. Additionally, participants reported that the NPs provided a comprehensive examination and spent an adequate amount of time with them. Participants stated that after collaborating with NPs, they felt better prepared to manage their health.<sup>12</sup>

Two years later, Heale and Pilon<sup>13</sup> conducted an exploratory study of the same Sudbury NP-Led clinic to re-examine patient experiences with primary care services and the overall patient satisfaction level since the initial research. A convenience sample of 1,865 patients over 18 years were mailed surveys to address accessibility, patient experience, lifestyle changes, and overall satisfaction. Six hundred eighty-two participants (36.5% response rate) reported being satisfied or very satisfied with services received in the last six months. Higher levels of satisfaction were associated with improved access to care, including shorter wait times to scheduled appointments, availability of same-day appointments, and waiting less than 15 minutes to see the NP. Patients with better control

of their medical condition and those who received counselling about lifestyle issues reported higher satisfaction levels. Additionally, patients who did not visit a walk-in clinic or ED since joining the clinic reported higher satisfaction levels. In contrast, patients aged 70 years and over, and those less than 29 years, were less satisfied with booking same-day appointments.<sup>13</sup>

The NP role was studied in hospital settings.<sup>14,15,17,18</sup> Thrasher and Purc-Stephenson<sup>18</sup> explored patient satisfaction with NPs providing primary health care services in six Ontario EDs. A self-administered, 21-item Likert-scale survey was given to 142 ED patients, 13-84 years, who agreed to complete it and return it by mail (80.3% response rate). The survey examined NP care based on comprehensiveness, attentiveness, and role clarity.<sup>18</sup> Participants reported being satisfied with the treatment and information and indicated that NPs spent adequate time during consultations, listened to them, and took their concerns seriously. Also, participants reported having a good understanding of the NP role. Interestingly, patients with a yearly income above \$50,000 reported higher levels of satisfaction with NPs.

Van Soren et al.<sup>14</sup> performed a mixed-methods, 18-month study to explore the NP role in nine Ontario hospitals (northern, pediatric, academic, and community). One part of this study included conducting two-week post-discharge audiotaped phone interviews with 17 patients to explore their perspectives regarding the care they received. During interviews, participants reported that NPs were available, provided thorough explanations, and provided timely, holistic, and comprehensive care. Participants also described NPs as caring, helpful, and responsive to their needs. Participants reported that NPs provided education, ongoing patient support, and more time with them than physicians. Overall, patients expressed a high level of trust regarding their interactions with NPs, and they were satisfied with the quality of the care provided.<sup>14</sup>

Later, Sarro et al.<sup>17</sup> examined patient satisfaction with 177 non-surgical NP management referrals at an ambulatory NP-led spine consultation clinic in a Canadian neuroscience centre. After an assessment from the NP, participants privately completed a patient satisfaction survey. Participants reported a high level of overall satisfaction with the NP



and indicated they “strongly agreed” that their examination was thorough and had a better understanding of their condition. Seventy-seven percent of participants indicated they would prefer to receive care from an NP rather than wait three to four months to see the specialist (spine surgeon).<sup>17</sup>

Stahlke et al.<sup>15</sup> conducted a qualitative study on nine patients in a Canadian outpatient breast cancer clinic to determine their NP-Led care experience. After audiotaped interviews, the following themes were determined: reaction to having an NP, the NP role, satisfaction with the NP, and added value through NP care. Initially, patients were surprised and unsure about receiving their care from an NP, but they became more comfortable after learning about the role. Overall, patients were satisfied with the care and reported that NPs added value by providing medically orientated care and emotional and spiritual support.<sup>15</sup>

A qualitative study conducted in a rural setting by Leipert et al.<sup>16</sup> utilized audiotaped face-to-face interviews to explore the experiences of nine women, ages 18-80 years, with NPs in rural southwest Ontario. Researchers grouped participants’ interviews and responses under the following themes: nursing knowledge of the NP, time the NP spent with participants, and thoroughness of the care provided. Participants had a positive perspective of nurses and felt NPs having a background as RNs contributed to the type of care they provided to their patients. Also, participants reported that the NP offered additional information and explained things in a way that was easy to understand. All participants indicated the NP spent enough quality time with them, making them feel that their health was valued. The care provided by the NP was considered thorough compared to less meticulous care received from a previous physician. Patients expressed there was a collaborative partnership with the NP, creating a sense of trust and respect.<sup>16</sup>

### 25.1.3 Emergency Departments

Hospital EDs in Ontario are attempting to reduce costs while improving patient experience and providing quality care. Unfortunately, there are negative impacts to patient experience from long wait times,<sup>19-21</sup> lack of courtesy from nurses and

physicians,<sup>19,20</sup> care provided,<sup>19,21</sup> and insufficient communication to patients.<sup>20</sup> Nevertheless, patients continue to use the ED for various reasons, including a perceived urgent condition, expecting to receive the best care, finding the ED available and accessible, and referral from a primary care provider.<sup>22</sup> Unfortunately, between 2017-2018, there were more than 9 million ED visits in Canada,<sup>22</sup> with more than 3 million considered less urgent and another 700 thousand nonurgent.<sup>23</sup>

Regrettably, patients who present to Canadian EDs with nonurgent complaints experience long wait times resulting in delayed treatments, lower ED satisfaction rates, and patients leaving without receiving care.<sup>24</sup> Wait times in Canadian EDs are longer than in other countries, with a higher percentage of patients waiting four or more hours before receiving treatment.<sup>24</sup> The Canadian health care system's average direct cost for a nonurgent ED visit is estimated at \$144, with an annual cost of \$400 million.<sup>25</sup> The high cost for nonurgent treatment should be one impetus for exploring alternate care models outside the ED. Patients who present to the ED with nonurgent wound-related complaints could receive treatment outside of an ED, provided that quality care is accessible in the community.

Research conducted to date suggests that patients' experience with NPs is consistently positive in Canada's various health care settings. Despite this, a comprehensive search of the literature did not reveal any articles about patient experiences with NP-Led wound care services. A study examining patient experience with an NP(W)-Led wound care service would provide valuable information to shape future NP practice. This study aimed to explore the experience of patients who received wound care through the NP(W)-Led community-based wound care service compared to those who received wound care in the ED.

## 25.2 Objectives

Specific research objectives for this study included:

1. To describe the patient experience for those who received wound care through an NP(W)-Led wound care service.

2. To determine if there is a difference in the patient experience between male and female patients who received wound care through the NP(W)-Led wound care service
3. To describe the patient experience for those who received wound care from the ED.
4. To determine if there is a difference in the patient experience between patients who received wound care through the NP(W)-Led wound care service and patients who received wound care in the ED.

## 25.3 Methods

### 25.3.1 Study Approval

Study approval was through one University Research Ethics Board (REB) (REB # 108999). A second university reviewed and accepted the ethics submission (REB# 18-074) (see Appendix A for REB approvals). The local LHIN and the community clinic provided letters of support (See Appendix B for Agency Support Letters).

### 25.3.2 Population

The study population included patients receiving wound management through a local LHIN in Southwestern Ontario. In this study, there were two groups: 1) patients who received care through a newly formed NP(W)-Led wound care service, and 2) patients who received wound care services in the ED. Recruitment of both groups took place during the 12 weeks of the NP(W)-Led wound care service (June 13, 2017, to August 31, 2017).

### 25.3.3 Sample Size Determination

Qualtrics© sample size calculator was used to determine the required number of responses needed to consider the results meaningful. Using on a 90% confidence interval (CI), with a 10% margin of error, 43 surveys were required to be returned for the NP(W)-Led wound care service, and 51 for the ED.

## 5.4 NP(W)-Led Wound Care Service

### 5.4.1 Inclusion Criteria

All patients who attended a 12-week NP(W)-Led wound care service between June 12 and August 31, 2017, were invited to complete a questionnaire. Inclusion criteria included persons: 1) 18 years or older, 2) registered to receive wound care through the LHIN, 3) with a wound or wound-related complaint (e.g. cellulitis), 4) presenting to the NP(W)-Led wound care service, and 5) able to read and understand English without a translator.

### 5.4.2 Consent

At the initial visit to the clinic, patients received a Letter of Information from the administrative staff, outlining the study's purpose, inclusion criteria, procedures, consent, possible risks and harms, benefits, compensation, voluntary participation, confidentiality, data storage and destruction, contacts for further information, and the potential for publication of the findings (see Appendix G). The NP(W) ensured that the patient had read the Letter of Information and answered any questions before obtaining written consent to participate in the NP(W)-Led wound care study.

Upon completion of the treatment in the NP(W)-Led wound care service, the NP gave study participants a Generic Short Patient Experience Questionnaire (GS-PEQ),<sup>26</sup> and a self-addressed, postage paid, return envelope to fill out and return. Participants were provided with the questionnaire at discharge, rather than each visit, to prevent repetitive survey completion. Participation was anonymous; there were no identifiers in the questionnaire.

### 5.4.3 Study Setting

The local LHIN, in collaboration with a community clinic in Southwestern Ontario, implemented an NP(W)-Led wound care service. The community clinic provided the NP(W) with the essential infrastructure (space, equipment) and personnel (administrative,

nursing). Additionally, the facility housed a publicly funded laboratory, x-ray and pharmacy, thereby providing immediate access to services and medications. A physician and a pharmacist were also on site and available as needed for consultation or collaboration. The local LHIN provided dressing supplies to ensure that the clinic used comparable products as the community home care services. The NP(W)-Led wound service offered care and consultation reflective of the NP scope of practice.

## 5.5 Emergency Department

### 5.5.1 Inclusion Criteria

Inclusion criteria included persons: 1) 18 years or older, 2) registered to receive wound care through the LHIN, 3) with a wound or wound-related complaint (e.g., cellulitis), 4) attended ED for wound care, and 5) able to read and understand English without a translator.

### 5.5.2 Recruitment

A retrospective chart review, conducted by the NP(W) researcher, included local LHIN patient charts for those who met the above criteria and attended the ED between June 12, 2017, and August 31, 2017. Chart audits revealed the ED visit reason; patients who attended the ED for wound care or a wound-related complaint (e.g., cellulitis) were included in the study. Through the mail, patients received the same Letter of Information and Patient Experience Questionnaire (GS-PEQ) as NP(W)-Led wound care service participants. Participants indicated their willingness to participate in the study by completing the survey and returning it by mail in the self-addressed, postage-paid envelope.

### 5.5.3 Study Setting

The ED in Southwestern Ontario serves a population of about 400 thousand and has more than 104 thousand annual visits.<sup>27</sup> The hospital operates out of two campuses and provides all acute care services in the region. People in this region frequently visit the ED

for wounds or wound-related care. Between January to April 2016, there were more than 1000 patients registered with wound-related issues.<sup>28</sup> The lead NP(W) researcher worked in the local ED and was the NP(W) who provided wound care in the NP(W)-Led wound care service.

## 5.6 Generic Short Patient Experiences Questionnaire (GS-PEQ)

The Generic Short Patient Experiences Questionnaire (GS-PEQ) developed in Norway by Sjetne et al.<sup>26</sup> measures patient experience by obtaining their opinion regarding treatment and the environment within which care was provided. The article discussing questionnaire development was published in English without mentioning that it had a prior publication in another language.

A literature search revealed no validated patient experience questionnaires specific to NPs and wound care. Satisfaction surveys specific to NP practice were not selected as they were not validated, or their population of interest was primary care. The Patient Experience Survey developed by HQO<sup>1</sup> is an excellent survey developed in Ontario to assess primary care patient experience. Unfortunately, the validity and reliability of a survey only apply to the population of intent. The GS-PEQ has not been validated for use in this population (patients receiving wound care); however, the initial tool was developed using validated tools used across various populations. The questionnaire (GS-PEQ) was selected because it is a much shorter survey than the Patient Experience Survey developed by HQO<sup>1</sup> and contains similar aspects. Both tools have questions regarding experience with the providers and the environment, but the HQO survey covers primary care questions such as prior appointments, which were not needed for this study.

Sjetne et al.<sup>26</sup> developed the GS-PEQ by examining six validated and similarly constructed surveys from various target populations (inpatient and outpatient services for adult and pediatric care, and inpatient and outpatients services for adult and pediatric mental health).<sup>26</sup> Their 10-item questionnaire used a five-point response scale (1 = 'Not all', 2 = 'To a small extent', 3 = 'To a moderate extent', 4 = 'To a large extent', and 5 =

‘To a very large extent’) ‘Not applicable’ was also an available response option. The questionnaire examined dimensions of care, including clinician services, staff services, involvement in decisions, incorrect treatment, organization, and facility accessibility.<sup>26</sup>

The GS-PEQ<sup>26</sup> is a valid and reliable tool. Validity refers to the tool’s accuracy to measure what it was intended to measure.<sup>29,30</sup> Content validity was demonstrated by the developers providing a detailed description of the instrument’s development and by having the questionnaire reviewed by 16 users. The reviewers examined the items for clarity, comprehensiveness, and to determine if topics were missing. Changes were made based on reviewers’ suggestions. Establishing response validity involves assessing participants’ responses to determine subject’s thoughts match the test and verify the material’s clarity. Additionally, establishing construct validity involved distributing the survey to 2812 patients to receive input regarding the applicability, importance, and comprehensiveness.

A reliable tool has consistency, with the results being reproducible under similar conditions.<sup>30</sup> The reliability of the GS-PEQ was determined through analysis of variance using regression. Analysis of variance measures internal reliability by examining the reliability of the results.<sup>30</sup> Regression analysis demonstrated 70% variance in general satisfaction was explained by the core items. Furthermore, ten random regression analyses using the original 23 piloted items consistently favoured the selected core items. A Cronbach’s alpha of 0.741 confirmed that the scale’s components were sufficiently correlated; an acceptable Cronbach’s alpha is  $\geq 0.70$ ,<sup>29</sup> and the closer to one, the more reliable the test.<sup>30</sup>

A randomized trial in Norway used the GS-PEQ. Wahlberg et al.,<sup>31</sup> used an adapted version of the GS-PEQ to examine patient experience with a referral and treatment process between general practitioner surgeries. Seven intervention groups used referral templates, and seven control groups continued with the standard referral. Wahlberg et al. adapted the GS-PEQ by adding four questions from two other validated questionnaires. Also, they added three additional questions regarding the referral process. Two regarded referring providers, and the final was an overall evaluation. After adding the additional

items, they piloted the questionnaire. Health care providers assessed content validity, and patients assessed face validity. Cronbach alpha was 0.83 for the additional four scale items added. The questionnaire was mailed with a postage-paid return envelope with a reminder sent to non-respondents after one month. The response rate was 82%. Missing data were handled by imputation. A Mann-Whitney U analysis compared the two groups, and regression analysis examined interaction. Overall, their study demonstrated satisfaction with the primary care surgeries in the intervention and control groups with no statistical difference for individual questions. Mann-Whitney U demonstrated significant results on two questions; median numbers were not provided, but a small positive difference was reported. The regression model demonstrated no statistical interaction between groups.

In 2020, Indrebo et al.<sup>32</sup> submitted an evaluation protocol outlining a future clinical trial to examine a new model of patient-reported outcome monitoring of ostomy care using a feedback system. Their protocol outlines they will be using the GS-PEQ to examine patient experience and satisfaction with care.

### 5.6.1 Additions to the GS-PEQ for this Study

For our study, participants provided demographic information regarding age (year and month of birth only to maintain anonymity), gender, income level, the highest level of education, and marital status. Participants also identified whether they had a scheduled appointment (booked through LHIN), were referred from a provider, or were a walk-in appointment (self-referral). In a previously completed quality improvement project (see Chapter 3), stakeholders indicated that access was a key factor when developing an NP(W)-Led wound care service. Therefore, the following question was added: Did you perceive the facility (clinic or ED) as accessible? If participants selected 1 (not at all) or 2 (to a small extent), there was an area to insert a comment about their response regarding accessibility (see Table 7 for GS-PEQ items). Adapting a questionnaire impacts validity of an instrument as it no longer measures the intended population.<sup>33</sup> To obtain an expert opinion, management reviewed the content of the new question.



**Table 7***Questions on the GS-PEQ*

- 
1. Did the clinician talk to you in a way that was easy to understand?
  2. Do you have confidence in the clinician's professional skills?
  3. Did you get sufficient information about your diagnosis/afflictions?
  4. Did you perceive the treatment as adapted to your situation?
  5. Were you involved in decisions regarding your treatment?
  6. Did you perceive the clinic's work as well organized?
  7. Did you have to wait before you were admitted for services at the clinic?
  8. Overall, was the help and treatment received by clinician satisfactory?
  9. Did you perceive the clinic as accessible?\*
  10. Overall, what benefit have you had from the care at the clinic?
  11. Do you believe that you were in any way given incorrect treatment (according to your own judgment)?
- 

\*additional question added to GS-PEQ

## 5.7 Data Analysis

A research assistant entered all data from the GS-PEQ into an excel spreadsheet which was imported into the IBM Statistical Package for the Social Sciences (SPSS) version 26 for data analysis. During analysis, excluded cases were those with less than 80% of the responses selected. Excluded cases were three percent of the total dataset, which falls within the acceptable removal range of between 5-10%.<sup>29</sup> For other cases, mean substitution treated missing data. Mean substitution for treating missing data allows the inclusion of more cases in the analysis.<sup>29</sup> Two participant cases, 3% of the total dataset, were excluded as they did not have responses selected for 80% of the questions on the scale (scale items). Other missing data ( $n=9$  responses) were handled using mean substitution, computed using the total Likert scale responses' average score. Demographics (gender, income, education, marital status) were left with missing data. Descriptive statistics described participants at the NP(W)-Led wound care service and those in the ED. IBM Statistical Package for the Social Sciences (SPSS) version 26 was used for data analysis.

### 5.7.1 Factor Analysis

After adding the new scale item, a factor analysis determined the number of underlying factors that explained the interrelationship between the questionnaire items. Factor

analysis with principal axis factoring analysis and varimax rotation was used to determine the underlying factors shared variance. The grouping was done through extraction, using eigenvalues  $\geq 1$ . Eigenvalues  $\geq 1$  are typically used to indicate the variables with the highest variance that represent the underlying construct.<sup>29</sup> There were three factors with Eigenvalues  $\geq 1$ , and of the three, one loaded eight variables (understand, confidence, information, perceive, involved, organized, accessible, benefit) represented the highest variance (56.4%). Cronbach's alpha of the eight variables was 0.866.

### 5.7.2 Patient Experience Score

The patient experience score reflected the total patient experience. A composite experience score was computed by summing the mean scores of the eight scale items discussed above. The distribution of the continuous variable patient experience score was non-normal as evidenced by a Shapiro-Wilk test of normality ( $p=.000$ ), and the ratio of skewness and kurtosis to the standard error of -4.039 and 2.05 respectively, which were both above 2 ( $< -2$  or  $> +2$ )<sup>29</sup> Additionally, the removal of outliers did not change the distribution.

Information from the individual scale items is important to NP practice. Therefore, the experience score and the individual items were both reported. To succinctly report questionnaire responses, the scale items (questions) were examined for conceptual representation and placed in the following categories: *Care* (care and treatment with clinician and institution), *Communication* (information and communication related to treatment), and *Accessibility* (wait time and clinic accessibility).

### 5.7.3 Mann-Whitney U Analysis

A Mann-Whitney U test is a non-parametric statistical analysis used to determine if there are differences between two groups for continuous or ordinal variables.<sup>29</sup> Males and females were two independent groups in the NP(W)-Led wound care service. A Mann-Whitney was the analysis used to determine any difference in the non-normally distributed patient experience score between the groups (males and females). Additionally, a Mann-Whitney U was used to compare participants in the NP(W)-Led

wound care service and the ED. All test assumptions for the Mann-Whitney U test were met, including 1) ordinal or continuous dependent variable; 2) two dichotomous categorical, independent groups; 3) independence of observation; 4) distribution of scores for both groups.<sup>29</sup> Statistical inferences were based on a two-tailed alpha of 0.05 or a 95% confidence interval (CI).

## 5.8 Results

### 5.9 NP(W)-Led Wound Care Service

The NP(W)-Led wound care service had a population of 112. Four patients returned after discharge from NP(W) care; therefore, 116 surveys were distributed. There were 51 questionnaires returned via mail, and 43 were required to determine meaningful results. After removing two incomplete cases ( $n=49$ ), the completed questionnaire response rate was 42%. Most respondents were male, over 71-years-of-age, and married. The majority of respondents reported high school as the highest level of education completed and an annual income ranging from \$21-40 thousand (see Table 8). Appointments were most often scheduled through the local LHIN clinic ( $n=32$ , 50.0%), others were walk-in (self-referred) ( $n=13$ , 20.3%), or clinic physician referrals ( $n=17$ , 26.6%) (two participants provided no data).

**Table 8**

*NP(W)-Led Wound Care Service Participant Demographics (n=49)*

<i>Variable</i>	<i>n*</i>	<i>%</i>	<i>missing</i>	<i>Selected N/A (chose not to answer)</i>
Gender			2	
male	32	65.3		
female	15	30.6		
Age (years)				
31-50	8	16.3		
51-60	11	22.4		
61-70	10	20.4		
over-71	20	40.8		
Annual Income (\$)			4	3
< 20,000	10	23.8		

<i>Variable</i>	<i>n*</i>	<i>%</i>	<i>missing</i>	<i>Selected N/A (chose not to answer)</i>
21-40,000	15	35.7		
41-60,000	9	21.4		
61-80,000	4	9.5		
>80,000	4	9.5		
Education (highest level completed)			4	2
high school	17	39.5		
college	12	27.9		
degree	10	23.3		
Master's/PhD	4	9.3		
Marital status				
single	6	13.0	3	
married	26	56.5		
divorced	3	6.5		
widowed	7	15.2		
separated	4	8.7		

\**n*=participants

### 5.9.1 Questionnaire Responses- NP(W)-Led Wound Care Service

Responses to the questionnaire for participants who attend the NP(W)-Led wound care service were reported under the categories *care*, *communication*, and *accessibility*.

**Care.** One hundred percent of the participants expressed confidence (large to very large extent) in the NP(W)'s professional skills. At the same time, 96% were satisfied with the help and treatment received from the NP(W) (large to very large extent). Eighty-eight percent indicated an overall benefit from their care (large to very large extent). The clinic was also perceived as organized *to a large or very large extent* by 86% of the participants. Ninety percent perceived that treatment was adapted to their situation (large to very large). While 94% indicated, they did not receive any incorrect treatment.

**Communication.** Ninety-six percent of the participants indicated *to a large, or very large extent* that the NP(W) talked to them in a way that was easy to understand, and 90% reported that the NP(W) provided enough information regarding their diagnosis/treatment

(large to very large extent). Eighty-two percent of participants indicated they were involved in treatment decisions (large to very large extent).

**Accessibility.** Eighty-two percent of the participants indicated that the clinic was accessible (large or very large extent). Further, 60% indicated none (no wait) to a very small wait before being seen.

### 5.9.2 Patient Experience Score Comparison NP(W)-Led Wound Care Service

The total patient experience score was a composite score of eight scale items examining patient experience. The range was 2.8- 5.0 with a mean of 4.56 and a standard deviation of .54. Patient Experience was compared for female and male participants in the NP(W)-Led wound care service. A Mann-Whitney U test was the statistical analysis used to determine if there were differences in the experience score between female and male participants who attended the NP(W)-Led wound care service. The patient experience score had a non-normal distribution. Therefore, the median score was reported instead of the mean. The median experience score was statistically significantly higher in females (4.88) than in males (4.63),  $U= 334, p =.03$  (see Table 9).

**Table 9**

*Mann-Whitney Analysis- Comparing Gender Patient Experience Score at NP(W)-Led Wound Care Service*

Variable	<i>n</i> *	Mean/SD	Median	Mann-Whitney U	<i>p</i> **
Patient experience score	49	4.55(.56)	4.86	334.00	.03
Male	32 <sup>+</sup>	4.41(.62)	4.63		
Female	15	4.87(.14)	4.88		

Note: SD= standard deviation

\**n*=participants

\*\*significance level is  $\leq .05$

<sup>+</sup> missing gender (*n*=2)

## 5.10 Emergency Department

There were 199 questionnaires mailed to patients who attended the ED, with 15 returned by participants who attended the ED, resulting in a response rate of 7.5%. The returned surveys are far below the 51 required to demonstrate meaningful results. Like clinic participants, most ED participants were male, over 71-years, married, and had completed high school. In contrast to clinic participants, most ED participants had an annual income of < 20 thousand dollars (See Table 10.) ED patients were walk-in (n=6, 40.0%), had booked appointments (n=5, 33.3%) or were referred (n=4, 26.7%).

**Table 10**

*ED Participant Demographics (n=15)*

<i>Variable</i>	<i>n*</i>	<i>%</i>	<i>missing</i>	<i>Selected N/A (chose not to answer)</i>
<b>Gender</b>				
male	11	73.3		
female	4	26.7		
<b>Age</b>				
31-50	3	20.0		
51-60	4	26.7		
61-70	4	26.7		
over-71	4	26.7		
<b>Income</b>				
< 20,000.	4	30.8		2
21-40,000.	3	23.1		
41-60,000.	2	15.4		
61-80,000.	2	15.4		
>80,000.	2	15.4		
<b>Education (highest level completed)</b>				
high school	6	42.9		1
college	5	35.7		
degree	3	21.4		
Masters/PhD	0	0.0		
<b>Marital</b>				
single	2	14.3		1
married	8	57.1		
divorced	2	14.3		

<i>Variable</i>	n*	%	missing	Selected N/A (chose not to answer)
widowed	0	0.0		
separated	2	14.3		

\*n=participants

### 5.10.1 Questionnaire Responses- ED

Responses to the questionnaire for participants who attend the ED for wound care are reported using the categories *care, communication, and accessibility*.

**Care.** One hundred percent of the participants had confidence (large to very large extent) in the ED provider's professional skills. Another 93% were satisfied with the help and treatment received from the provider (large to very large extent). Eighty-seven percent indicated an overall benefit from their care (large to very large extent). The ED was perceived as organized to a large or very large extent by 93% of the participants.

Additionally, 87% perceived their treatment was adapted to their situation (large to very large). While another 87% indicated, they did not receive any incorrect treatment.

**Communication.** Eighty-seven percent of the participants indicated to a large, or very large extent that the ED provider talked to them in a way that was easy to understand. Another 100% indicated that the ED provider gave them enough information regarding their diagnosis/treatment (large to very large extent). Sixty-seven percent of the participants indicated they were involved (large to very large extent) in their treatment decisions.

**Accessibility.** Ninety-three percent of the participants indicated that the ED was accessible (large or very large extent). However, 47% of the participants indicated a long wait before being admitted for service (large or very large extent).

## 5.10.2 Patient Experience Score Comparison Between NP(W)-Led Wound Care Service and the ED

The patient experience score was compared for patients attending the NP(W)-Led wound care service and those who received wound care in the ED (see Table 11). Mann-Whitney U analysis demonstrated no statistical difference between the patient experience scores in the clinic and the ED ( $p=0.871$ ). Even if the difference between the groups were statistically significant, the small sample size would prevent generalizing findings.

**Table 11**

*Mann Whitney Analysis Comparing Patient Experience Score by Site*

Variable	n*	Mean/SD	Median	Mann-Whitney U	P**
Patient experience	64	4.56(.54)	4.73	357.50	.871
Clinic	49	4.55(.56)	4.86		
ED	15	4.58(.45)	4.63		

Note: SD= standard deviation

\*n=participants

\*\*significance level is  $\leq .05$

## 5.11 Discussion

Examining patient experience provides essential information about the needs and expectations of the consumer. This study addresses a literature gap by providing new information about patient experience with NP(W)-Led community-based wound care. Further, this is the first study examining patient experience with an NP(W)-Led community wound care program in Canada. Participant responses to the GS-PEQ suggest that care provided in the NP(W)-Led wound care service and the ED was associated with a positive patient experience.

Eighty-two percent of participants reported involvement in treatment decisions at the NP(W)-Led clinic compared to 67% in the ED. This could be related to the general ED



environment or the negative impact related to the care provided.<sup>19,21</sup> Also, there could be a contributing association between long wait times,<sup>19-21</sup> lack of courtesy from nurses and physicians,<sup>19,20</sup> and insufficient communication to patients.<sup>20</sup> Additional research will help determine associations regarding patient involvement in ED.

Patients' views regarding accessibility and wait times are an essential component of the patient experience.<sup>13,17</sup> In this study, the NP(W)-Led wound service and the ED were both considered accessible; however, there were differences related explicitly to waiting. Participants who attended the NP(W)-Led service reported a short wait compared to the ED, where participants indicated a long wait before being admitted for service. This finding is not surprising as wait times in the ED are generally considered too long.<sup>24,25</sup>

International Council of Nurses reports that patients have a high degree of satisfaction with NP care.<sup>33</sup> Positive patient reports with NPs are comparable to other Canadian studies that examined patient experience with NPs across multiple health care sectors. Prior Canadian research regarding NPs in various settings (ED, NP-Led, rural, hospital, neurological, oncology) found that NPs provide comprehensive assessments<sup>12-18</sup> that reflect patients' needs.<sup>12,13,18</sup> Additionally, oncology and NP-Led Clinic patients report that NPs have a caring, friendly, and respectful approach.<sup>12-15</sup> Likewise, NPs in EDs and NP-Led Clinics are considered attentive, and they provide sufficient information to patients.<sup>12,13,18</sup> As well, NPs working in the ED take concerns seriously.<sup>18</sup> Furthermore, there is a high level of trust amongst patients in the quality of the care provided by hospital-based NPs.<sup>14</sup>

In a retrospective study conducted in the United States, patient surveys' secondary data examined care providers and practices. Most patients had physicians as their primary care provider, with NPs accounting for a low percentage (n=509, 0.73%). However, using a scale of zero- worst provider to ten- best provider, patients were extremely satisfied with NP care ( $M= 9.16$ ,  $SD =1.46$ ).<sup>34</sup>

Female participants in the NP(W)-Led wound care service had a higher median score on patient experience than males. These findings are exciting and could be important when designing a wound care program, as it is necessary to determine what motivates

participants to attend or participate in a program. Gender-specific research can help improve clinicians' communication and outline service gaps that address gender preference.

A study by Weisman et al.,<sup>35</sup> in the United States, examined the relationship between gender and satisfaction in primary care. Participants included 1691 female and 760 male adult patients of various races, located across five urban and rural locations. Sixty-two percent of their 20-item survey were analyzed. They found that visit content was the strongest predictor of overall satisfaction for both females and males. Satisfaction for both genders increased with the amount of time spent with the provider. Females were more satisfied if the provider answered questions and was aware of previous visits and nursing care. Males were satisfied with the personal interest shown in them and their concerns. Interestingly, a thorough exam or explanation of procedures and tests were not predictors of satisfaction for either gender. Future surveys can improve gender-specific care by including and examining variables that reflect gender differences.

These findings are comparable to other studies that examined NP-Led clinics and found them accessible<sup>12,13,17</sup> with short wait times to see an NP.<sup>12</sup> One study noted that patients were able to receive a same-day appointment.<sup>13</sup> Same-day or walk-in appointments are essential for any community-based wound care service that has a goal of reducing ED visits.

The utilization of NP(W)s to reduce nonurgent ED visits for wound care has not been studied in Canada. Research into the utilization of NPs in long-term care has shown a 43% reduction in transfers to the ED for patients with nonurgent conditions.<sup>36,37</sup> The success of NPs in long-term care to reduce nonurgent transfers to the ED provides additional opportunities to explore the role of NPs in reducing ED visits for other nonurgent visits such as wound care.

## 5.12 Limitations

This study took place in one area in Southwestern Ontario. This single location limits the generalizability of the results throughout Ontario and Canada. Sampling based on

available or convenient patients also limits the generalizability as the participants may not reflect the entire population.<sup>38</sup> Further studies are needed to examine patients' experience with NP(W)-led wound care throughout Ontario and Canada.

Response rates from the ED were lower than expected. Using small sample sizes makes it challenging to infer reliable conclusions.<sup>39</sup> Non-response rates can impact a study's validity as the differences between those who do not respond to surveys, and those who do can create a non-response bias.<sup>40</sup> Participant's characteristics may influence responses. For instance, those more satisfied are more likely to respond than those less satisfied, and in small sample size, these characteristics may influence the results. A larger sample size provides data more reflective of the general population. It helps to reduce non-response bias and reduce the impact of patient characteristics.

The results did not establish a statistically significant difference in the patient experience between those receiving wound care in the community clinic and those receiving wound care in the ED. The anonymous collection of the ED survey made it impossible to determine non-responders to send out a reminder. Sending out reminders to the entire group could result in participants completing more than one questionnaire. As a result, the ED respondents' low response rate made generalization impractical. The acceptable response rate of mailed surveys varies dependent on the source ranging from 25%-75%.<sup>40</sup>

The ED's inadequate response rate was unexpected as a previous study done in EDs in Ontario had an 80% response rate.<sup>18</sup> One potential reason for this high response rate may have been the incentive (draw for \$100) upon submitting the survey. Another reason was that they recruited their participants while in the ED, asking them to return the survey by mail.<sup>18</sup> Future studies should look at ways to improve participant response as research demonstrates that incentives<sup>43,44</sup> and reminders<sup>44,45</sup> to increase responses and reduce non-response rates. The survey can also be offered face-to-face or mixed-mode (by web and mail) to combine each delivery mode's strength and to reduce the chance of sample bias.<sup>44</sup>

The NP(W) researcher providing wound care can increase the chance of creating a social desirability bias as patients may worry that care may be impacted if they do not complete

the survey or do not provide positive responses.<sup>40</sup> Participants received the survey to complete and return anonymously by mail to reduce social desirability bias potential. Additionally, the questionnaire was given to the patient immediately after receiving care before being discharged from the NP(W)-Led wound care service allowing participants to have good recall when filling out the GS-PEQ. Factors related to the transition of CCACs to LHINs that happened concurrently with this study may have influenced patient experience.

### 5.13 Implications for practice

As the NP role expands into specialized areas such as wound care, it is essential to monitor progress, assess patient experience changes, and define areas that need improvement. Using surveys and questionnaires to gather data about patients' opinions and preferences will help NPs keep a patient-centred practice. NPs can provide patient care and coordinate services to promote patients transitioning from acute through to community care. As such, this study's information can give direction for NP(W)s looking to take on leadership roles in wound care. This study provides information regarding patient experience related to care, communication, and access, useful when designing an NP(W)-Led community wound care program.

### 5.14 Implications for Future Studies

The low response rates from ED for the GS\_PEQ made generalizing the Mann-Whitney analysis unreliable. Repeating this study with better methodology may produce results that would allow a better comparison between the groups. Results from a repeat study may provide information that will help reduce nonurgent use of the ED for wound care and improve community services and shape the future role of NPs specializing in wound care.

Future longitudinal studies need to examine patients' perspectives with NP(W)s providing wound care. Qualitative studies allow for a fine-grained analysis to understand the patient's lived experience and offer insight into factors that inform positive patient experiences and provide direction for change and evaluative measures. It would also be

of value to examine the patient experience with NP(W)s providing wound care across various health care settings, ensuring the study allows for comparison to usual care.

### 5.15 Conclusion

This study indicated that patients had a positive experience with the NP(W)-Led wound care service and the ED. Additionally, although a small sample size, female participants in the NP(W)-Led wound care service had a higher patient experience score than males. This study also sought to determine if there was a difference in patient experience between receiving wound care from the NP(W) and receiving wound care in the ED. Unfortunately, due to the small sample size in the ED, additional studies are warranted.

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## Chapter 6

### 6 Emergency Department Utilization Before, During, and Post Implementation of a Nurse Practitioner Community-Based Wound Care Service

The utilization of emergency departments (EDs) impacts the Canadian healthcare system. Canadians report attending EDs because they feel they receive the best care.<sup>1</sup> Additionally, Canadians report that EDs are available and accessible,<sup>2,3</sup> and there is a lack of community resources,<sup>4</sup> with difficulties accessing their providers on weekends, holidays, and evenings.<sup>3</sup> This lack of accessible quality community care perpetuates ED utilization for many conditions, including those considered nonurgent.

The Canadian Triage Acuity Scale (CTAS)<sup>5</sup> is used to classify the 25-35% of annual ED visits considered nonurgent.<sup>6</sup> The ED utilization for nonurgent conditions can add to ED wait times, resulting in delayed treatments, decreased satisfaction, and potentially patients leaving without care.<sup>7</sup> Additionally, treating nonurgent conditions uses valuable ED resources and personnel time, with an average visit costing \$144<sup>8</sup> and a \$400 million annual cost.<sup>1</sup> Managing nonurgent conditions in the community could result in significant savings as the cost for a community clinic visits is significantly less at \$40.<sup>9</sup>

In Canada, there is a lack of information regarding ED utilization for patients with wound-related conditions. In 2017-2018, cellulitis, a wound-related nonurgent complaint, was listed as one of the top 10 reasons for visiting a Canadian ED. These visits accounted for more than 142,000 visits, of which 93% were discharged.<sup>6</sup> Other wound-related conditions that could be less urgent or nonurgent include antibiotic therapies and dressing changes.<sup>1</sup> Treating patients with nonurgent or less urgent wound care outside of the ED could result in significant savings.

In one urban center in Southwestern Ontario (Canada), two hospitals are amalgamating into one larger facility, providing an opportunity to make changes to the acute and community care programs and explore the utilization of additional models of care. The

Community Capacity Plan<sup>10</sup> developed to guide restructuring suggests using community-based services for wound care and follow-up to reduce ED visits. The plan's vision for reducing ED visits includes utilizing nurse practitioners (NPs) to provide outpatient wound care.<sup>10</sup> Nonurgent wound-related conditions could be treated in community settings by NPs who have graduate-level wound care education (NP(W)). Examining the effect of an NP(W)-Led community-based wound care service on ED utilization would provide valuable information for the hospitals' amalgamation.

## 6.1 Background

### 6.1.1 Nurse Practitioners

NPs are registered nurses (RN)s who completed graduate-level education and a comprehensive provincial exam. The College of Nurses of Ontario (CNO) regulates NPs' scope of practice. Regulation through the CNO gives NPs the authority to diagnose, provide treatments, order and interpret laboratory and diagnostic tests, and order medications, including controlled substances. To promote a consultative and collaborative interprofessional team, NPs can initiate referrals to specialists and other health care providers.<sup>11</sup> Post-graduation, NPs may seek additional graduate-level wound care education. Advanced education in wound care provides NP(W)s with knowledge and clinical experience, enabling them to provide comprehensive evidence-informed care.

### 6.1.2 ED

No published studies examined ED utilization specific to wound care. What is mentioned, and discussed above, are examples of nonurgent conditions that could receive treatment outside of the ED.<sup>1</sup> This thesis focuses on one location in Southwestern Ontario, where, in three months, in 2016, 1,100 patients received wound management through the ED.<sup>12</sup> Working in this local ED, the NP(W) researcher and author of this thesis noted that patients with nonurgent wound-related issues frequently attended the ED. Examples of nonurgent wound care noted by the NP(W) included dressing changes,

sutures, suture removal, superficial animal bites, wound assessments, and wounds secondary to minor traumas. Likewise, the NP(W) noted wound-related conditions such as medication requests, intravenous antibiotic therapy, troubleshooting peripherally inserted central catheters, insertion of intravenous catheters, follow-up, diagnostic or laboratory testing, and “to meet” specialists.

### 6.1.3 Canadian Triage Acuity Scale

RNs use the CTAS<sup>5</sup> to prioritize individuals who visit the ED based on their presenting complaints and initial triage assessment. Based on the initial evaluation, RNs assign patients a level of acuity ranging from Level 1 (resuscitation), which is considered a life-threatening condition, to level 4 (less urgent) and 5 (nonurgent). In 2017-2018 there were more than 9 million ED visits throughout Canada. Of these visits, 3 million were considered less urgent (33%), and almost 700,000 (8%) were deemed nonurgent.<sup>6</sup> The local ED in Southwestern Ontario has more than 130,000 yearly visits, with approximately 38,000 triaged as nonurgent or less urgent (CTAS 4 & 5).<sup>10</sup>

## 6.2 NP Utilization

No published studies examined ED reductions for wound care using NP(W)-Led community-based wound care services. Fortunately, research in Ontario (Canada) explored utilizing NPs in long-term care (LTC) facilities to examine the impact on ED transfers and admissions.<sup>13-15</sup> In Ontario, in 2009, there were 14 Ministry of Health and Long-term Care (MOHLTC) funded NP-Led Long-Term Care Outreach Teams (NLOTs) implemented to reduce nonurgent ED visits in this population. The implementation of NLOTs into LTC facilities resulted in a 43% reduction in transfers to the ED for patients with nonurgent conditions.<sup>13,14</sup>

An observational prospective cohort study explored the impact of NP-Led outreach programs in LTC.<sup>15</sup> In their study, the authors compared case presentation, case resolution, and ED transfers between RNs, NPs, and physicians. RNs transferred more patients to the ED (49%) than the physician (6.1%) or NPs (6.7%). Overall, the NPs in the study treated more chronic or exacerbated chronic conditions than the RNs or

physicians. Also, NPs managed most of their cases at the facility, with only 10% of their cases requiring transfers to the ED. All NP patient transfers were urgent cases, and RNs were 20 times more likely to send patients to the ED than NPs or physicians. These studies<sup>13-15</sup> demonstrate that the utilization of NPs in LTC homes decreases ED visits for the geriatric population.

### 6.3 NP(W)-Led Wound Care Service

The Local Health Integration Network (LHIN), in collaboration with a community clinic in Southwestern Ontario, implemented an NP(W)-Led community-based wound care service. Community nurses referred patients who required care within the scope of practice of an NP. Referral included consultation or assessment of a new wound, changes to an existing wound (stalled or nonhealing), infection concerns, and requests for medication, laboratory, diagnostic test, or referral to a specialist or another health care provider. The community clinic had a ministry-funded laboratory, x-ray, and pharmacy to provide immediate access to diagnostic services and medications. Also, a physician and pharmacist were on-site for consultation or collaboration with the NP(W) as needed. The NP(W) provided comprehensive assessment and treatments to patients through the NP(W) wound care service. Patients received care within the NP scope of practice, based on practice standards sanctioned by the CNO. The NP(W) wound care service goal was to reduce nonurgent ED visits for patients requiring wound care.

### 6.4 Objectives

Research objectives for this study included:

1. Determine the reasons for local LHIN patients seeking wound care in the ED while an NP(W)-Led wound care service was available.
2. Describe the diagnoses of wound-related conditions for local LHIN patients seeking wound care via the ED.
3. Determine how ED utilization changed before, during, and after implementing an NP(W)-Led wound care service.

## 6.5 Methods

### 6.5.1 Study Approval

Study approval was through one University Research Ethics Board (REB) (REB # 108999). A second university reviewed and accepted the ethics submission (REB# 18-074) (see Appendix A for REB approvals). The local LHIN and a community clinic provided letters of support (See Appendix B for Agency Support Letters).

## 6.6 Population

The study population included patients registered to receive community wound management through the local LHIN in Southwestern Ontario. This study included patients in the population of interest who sought wound care in the ED between September 1, 2016 - November 20, 2017.

## 6.7 Inclusion/Exclusion Criteria

Inclusion criteria included persons: 1) 18 years or older, 2) registered to receive wound care through the local LHIN, and 3) presented to the Southwestern Ontario ED for wound or wound-related care between a) September 1, 2016, to May 31, 2017; b) June 12, 2017, to August 31, 2017; or c) September 1, 2017, to November 20, 2017.

## 6.8 Recruitment

The NP(W) researcher completed retrospective chart reviews for patients registered with the local LHIN to receive community wound care. The local hospital sends out a notification to the LHIN whenever a patient registered under the LHIN visits the ED and the reason for the visit. The patients registered with the LHIN to receive community wound care and who visited the ED, as per ED notification, were included in the chart audit. The local LHIN information technology (IT) department provided the researcher with view-only access for charts with ED visit notification before (September 1, 2016, to May 31, 2017), during (June 12, 2017, to August 31, 2017), and after (September 1,



2017, to November 20, 2017) the implementation of the NP(W)-Led wound care service. The start date coincided with the beginning of ED notifications from the local hospital and was longer to provide baseline information before implementing the NP(W)-Led wound service. For this period, chart audits were done on an arbitrary number (25%) of randomly selected charts via IBM Statistical Package for the Social Sciences (SPSS) version 26. Chart audits for during and after timeframes included all charts for patients registered to receive community wound care who visited the ED.

## 6.9 Data Extraction

Patients registered to receive community wound care through the local LHIN visited the ED for various reasons. Not all of these patients went to the ED to receive wound care; they visited the ED for other reasons, including but not limited to complaints related to cardiac, respiratory, or abdominal conditions. During the timeframes discussed above, all ED visits in the population of interest were totalled and categorized as wound or non-wound presenting complaints. The Local LHIN information technology (IT) department established a program with a “view-only” link for the NP(W) researcher to access only charts of patients who were enrolled to receive wound care through the local LHIN during the periods stated above. Accessible information included medical update records (MURs), nursing notes, treatment records, and ED records scanned into the system. Data extracted for charts categorized as a wound presenting complaint included the date of the ED visit, gender, age, nursing visits 30 days before a nursing visit or the previous ED visit, reason for the ED visit, diagnosis and primary wound care provider. The person deemed the most responsible provider was the provider who wrote more than 50% of the wound-related orders. Categories for wound care providers included the ED (physician or NP), primary care provider (physician or NP), or specialist (vascular, infectious disease, orthopedic, plastics, general surgery).

## 6.10 Data Analysis

Before data analysis, the dataset was assessed for missing data. Descriptive statistics were only analyzed on extracted data from charts categorized as a wound presenting

complaint. Data analysis (two-proportion z-test) included the total number of charts categorized as wound and non-wound. A two-proportion z-test examined the percentage change between the total ED visits (N) and the visits specific to wound care (n), at the following two points: 1) before and during the wound care service 2) during and after the wound care service and after the service. IBM Statistical Package for the Social Sciences (SPSS) version 26 was used for data analysis. Statistical inferences were based on a two-tailed alpha of 0.05 or a 95% confidence interval (CI).

## 6.11 Results

There were missing data (3.3%) related to the most responsible provider; missing data was not altered by imputation to avoid placing participants into the wrong category. There were a total of 2066 (N) charts audited for this study. Of the 2066 charts audited, N=554 corresponded to the audit point before the NP(W)-Led wound care service (September 2016 to May 2017). Seven hundred sixty-one (N) charts corresponded to the 12 weeks during the NP(W)-Led wound care service and N=751 after completing the NP(W)-Led service. Participants were between the ages of 18-105 years; the mean age was 64. Most participants who presented to the ED for wound care over the study period were male and had a specialist who wrote more than 50% of the wound care orders. The average number of community-based nursing visits in the 30 days before the ED visit was eight (see Table 12).

**Table 12**

*Patient Demographics ED participants*

Variable	Before <sup>1</sup> (n=331)	During <sup>2</sup> (n=375)	After <sup>3</sup> (n=418)
Average number of nursing visits in the 30 days prior to ED visit	<i>M</i> =9.0	<i>M</i> =7.7	<i>M</i> =7.3
Age (mean in years)	<i>M</i> =65	<i>M</i> =64	<i>M</i> =63
	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)
Gender			
Male	200(60.4)	225(60.0)	213(51.0)
Female	131(39.6)	150(40.0)	205(49.0)

Variable	Before <sup>1</sup>		Variable
Primary wound care provider* ED			
FD/NP	68(22.8)	49(13.2)	28(6.7)
Specialist	49(16.4)	78(21.0)	116(27.8)
	181(60.7)	244(65.8)	274(65.6)

Note. M=mean, n(%) = number and percent of visits, FD/NP= family doctor/nurse practitioner, Specialist = physician (vascular, orthopedic, plastics, infectious disease),

\*missing data= 3.3%,

<sup>1</sup> Randomly Selected Charts Between September 1, 2016, and May 31, 2017(n=331)

<sup>2</sup> Data from ED During Wound Care Service (June 12, to August 31, 2017) (n=375)

<sup>3</sup> Data from ED After Wound Care Service (September 1, to November 20, 2017) (n=418)

Total N= 2066, n=1,124

## 6.12 ED Visits

Approximately eight percent of the patients presenting to the ED during the study were admitted to the hospital. The admissions remained consistent before 24(7.3%), during 26(6.9%), and after the NP(W)-Led wound care service 32(7.7%). The top ten reasons for wound-related visits to the ED are in Table 2. The most common reason participants went to the ED was for a return visit at the ED provider's request. The ED providers requested the patient return to the ED for follow-up, additional medication, and laboratory or diagnostic testing. The second most common reason for an ED visit was a referral from a community nurse. Community nurses sent the patient to the ED for reasons including a request for medication, wound assessment, intravenous assessment, or requesting laboratory or diagnostic testing. Patients also elected to go to the ED for various reasons, including assessing or reassessing wounds, ruling out infection, and assessing intravenous access (see Table 13). There were similar wound-related diagnoses seen at all three points. Diabetic foot ulcers were the most common of the top ten diagnoses seen in the ED at all three times (see Table 14).

**Table 13**

### *Top Ten Reasons for Wound-Related Visits to the ED*

Reason for visit	Before <sup>1</sup> (n=331)	During <sup>2</sup> (n=375)	After <sup>3</sup> (n=418)	Total
	n(%)	n(%)	n(%)	n(%)
ED generated	60(18.1)	63(16.8)	68(16.3)	191(17)
Sent by community nurse	69(20.8)	52(13.9)	50(12%)	171(15.2)
Patient driven ED visit (by reason)				
Assess wound	28(8.5)	59(15.7)	48(11.5%)	135(12)

Reason for visit	Before <sup>1</sup>	During <sup>2</sup>	After <sup>3</sup>	Total
	(n=331)	(n=375)	(n=418)	
	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)
Assess infection	27(8.2)	35(9.3)	37(8.6)	99(8.8)
Assess cellulitis	24(7.3)	16(4.3)	22(5.3)	62(5.5)
Assess pain/swelling/ redness/other	11(3.3)	18(4.8)	31(7.4)	60(5.3%)
Intravenous/PICC assessment	11(3.3)	20(5.3)	24(5.7)	55(4.9)
Reassess wound	16(4.8)	13(3.5)	11(2.6)	40(3.5)
Assess post-operative wound	13(3.9)	12(3.2)	12(2.9)	37(3.2)
Sent by provider to receive the first dose of intravenous antibiotics	8(2.4)	15(4)	15(3.6)	38(3.4)

*Note.* PICC- Peripherally inserted Central Catheter, n(%) = number and percent of visits

<sup>1</sup> Randomly Selected Charts Between September 1, 2016, and May 31, 2017(n=331)

<sup>2</sup> Data from ED During Program (June 12, to August 31, 2017) (n=375)

<sup>3</sup>Data form ED After Program (September 1, to November 20, 2017) (n=418)

Total N= 2066, n=1,124

**Table 14**

*Top Ten Wound-Related Diagnosis in ED*

Diagnosis	Before <sup>1</sup>	During <sup>2</sup>	After <sup>3</sup>	Total
	(n=331)	(n=375)	(n=418)	
	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)
Diabetic foot ulcer	62(18.8)	90(24)	95(22.7)	247(22)
Post op wound	30(9.1)	54(14.4)	67(16)	151(13.4)
Cellulitis	45(13.6)	34(9.1)	60(14.4)	139(12.4)
Venous ulcer	40(12.1)	42(11.2)	52(12.4)	134(11.9)
Arterial disease/ulcer	30(9.1)	31(8.3)	21(5)	82(7.3)
Osteomyelitis	28(8.6)	15(4)	20(4.8)	63(5.6)
Venous stasis dermatitis	14(4.2)	26(6.9)	18(4.3)	58(5.1)
Abscess	19(5.7)	22(5.9)	10(2.4)	51(4.5)
Traumatic wound	17(5.1)	9(2.4)	20(4.8)	46(4.1)
Pressure injury	15(4.5)	13(3.5)	15(10.8)	43(4.8)

*Note.* n(%) = number and percent of visits

<sup>1</sup> Randomly Selected Charts Between September 1, 2016, and May 31, 2017(n=331)

<sup>2</sup> Data from ED During Wound Care Service (June 12, to August 31, 2017) (n=375)

<sup>3</sup>Data form ED After Wound Care Service (September 1, to November 20, 2017) (n=418)

Total N= 2066, n=1,124

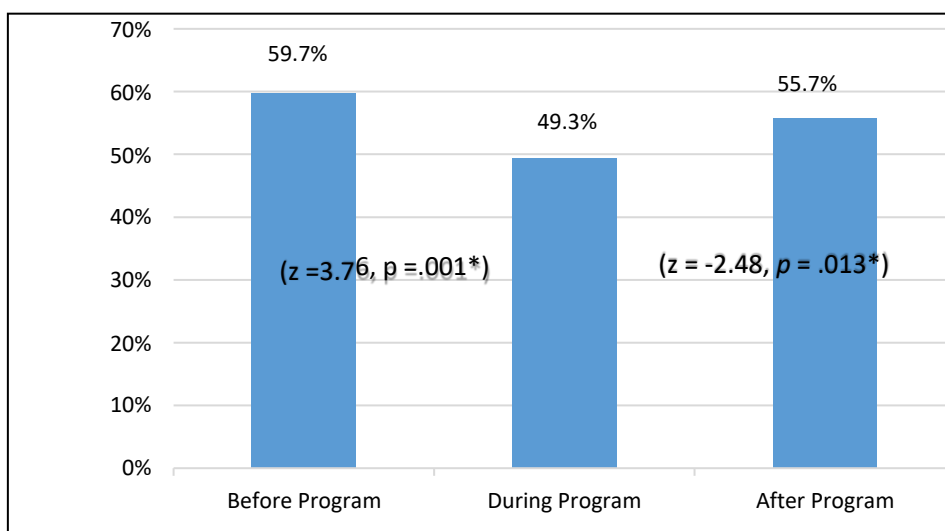
## 6.13 Utilization of ED for Wound Care

The reasons for visiting the ED were reviewed to determine wound and wound-related visits. Fifty-four percent of the total ED visits were wound-related (n=1,124 out of N=2066). Of the 1124 charts, there were 331 wound-related visits before, 375 visits during, and 418 after implementing the NP(W)-Led wound care service. A two-

proportions z-test demonstrated a statistically significant difference between the number of ED visits for wound care at two points 1) *before* compared to *during*, and 2) *during* compared to *after* implementing the NP(W)-Led wound care service (see Figure 1).

**Figure 1**

*Percentage of ED Visits: Before,<sup>1</sup> During,<sup>2</sup> and After NP(W)-Led Wound Care Service*



\*statistical significance is  $\leq .05$

<sup>1</sup> Randomly Selected Charts Between September 1, 2016, and May 31, 2017 ( $n=331$ )

<sup>2</sup> Data from ED During Wound Care Service (June 12, to August 31, 2017) ( $n=375$ )

<sup>3</sup> Data from ED After Wound Care Service (September 1, to November 20, 2017) ( $n=418$ )

Total  $N=2066$ ,  $n=1,124$

## 6.14 Discussion

Chart audits in this study examined ED utilization for wound care patients registered with the local LHIN at three intervals: before, during, and after implementing an NP(W)-Led wound care service. Audits revealed that many patients used the ED for wound care even though most had regular nursing visits and a specialist following them. There was no change in reasons for seeking wound care in the ED over time. The number of ED visits for wound care decreased slightly during the time corresponding to the NP(W)-Led wound care service and then rebounded after the service closed.

Data from this study provides information about ED utilization for wound care and, in particular, ED use for patients registered with the local LHIN to receive community wound care services. It seems reasonable to expect that ordering medications, providing

peripherally inserted central catheter assessments, initiating the first dose of intravenous antibiotics, and ordering laboratory and diagnostic testing in the community would reduce ED visits in this population. However, it is vital to note that community nurses' and patients' willingness to utilize community services is essential to lowering ED utilization for nonurgent wound care.

The NP(W)-Led wound care service provided community nurses with the opportunity to refer patients to see the NP(W) if they felt the patient's condition warranted assessment and treatment within the NP(W)'s scope of practice. Community nurses assess patients regularly, allowing them to note any subtle changes in conditions requiring additional intervention. In this study, the expectation was a dramatic decrease in the number of referrals to the ED; unfortunately, community nurses continued to refer patients to the ED during the NP(W)-Led wound care service. Exploring the reasons for the ongoing referral to the ED by community nurses was not an objective of this study. Future research should focus on community nurses' and patients' willingness to avoid using the ED if alternative options are available.

The most common reason for utilizing the ED was at the department's request (ED generated). Reducing or preventing ED-generated returns requires the availability of community services and willingness for patients to utilize those services. Additionally, the services must be available after hours, weekends, and holidays, as these are ED utilization times.<sup>3</sup> The NP(W)-Led wound care service did not have extended hours; the service followed the community clinic's hours, and same-day appointments were only available biweekly.

Chart audits highlighted that one of the "top 10" diagnoses for people attending the ED was cellulitis. This information is consistent with previous data gathered via the Canadian Institute for Health Information that reported cellulitis was a common reason for visiting a Canadian ED in 2017-2018.<sup>6</sup> In our study, data demonstrated that visiting the ED to *assess cellulitis* decreased during the NP(W)-Led wound care service, possibly suggesting that patients are willing to receive treatment in the community for this condition. Further studies need to focus on examining predictors for ED visits.

It is essential to mention that not all wounds can receive treatment solely in a community setting. In this study, seven percent of the patients presenting to the ED for wound care were admitted to the hospital. The number of admissions to the hospital may not change with the institutions of community programs. However, there is a possibility that providing integrated community and acute care could result in better preventative measures, early treatments, and, when required, direct admissions that bypass the ED. Future studies may note a reduction in admissions for patients with wound-related conditions with the implementation of evidence-informed preventative treatments.

### 6.15 Limitations

A retrospective chart audit does not account for patients' or providers' characteristics that can impact a study. Additionally, this study took place in one locality in Southwestern Ontario, limiting the results' generalizability. The patients who attended the NP(W)-Led wound care service may not represent patients in other regions. A longer study of the NP(W)-Led wound care service using various forms of advertisement, having varied hours, and establishing specific criteria by cases may provide different results. A permanent service is easier to embed into practice and may receive better uptake by community nurses and patients.

Data retrieval was a long and demanding process. "Assess wound" was a common term used in charting by community nurses, ED providers, and was a category of ED notification. Chart audits did not provide information regarding the rationale for the wound assessment nor whether it was patient or provider-driven. Retrieving more detailed information from these charts would require contacting nurses, providers, and patients. Changing requirements for wound documentation at the local LHIN would make it easier to collect and analyze future studies data. The researcher only had access to charts coded as attending the ED and the reason for the visit. However, data retrieval performed independently by two reviewers or blinding the visit reduces the risk for bias and ensures the finding's accuracy.

## 6.16 Future Research

Examination of predictors of ED visits was not part of this study. Future studies should use regression models to examine predictors of using the ED while controlling for confounding variables that may influence ED utilization. Future research studies should also include a mixed-method approach with concurrent quantitative and qualitative components to provide insight into the patients' and providers' perspectives regarding ED utilization for wound care.

## 6.17 Implications for Practice

ED utilization for nonurgent complaints is an issue throughout Ontario. Providing accessible community care with the appropriate health care provider can reduce ED visits for nonurgent wound care. Implementing NP(W)-Led community wound care programs is an opportunity for the LHINs across Ontario to reduce ED utilization for wound care. Providing patients with options for comprehensive community wound care aligns with mandates of the Ministry of Health and Long-term Care and the LHIN to reduce reliance on Ontario EDs. Ongoing monitoring of the community setting with repeated chart audits would ensure sustainability.

## 6.18 Conclusion

This study examined the diagnoses and reasons for local LHIN patients seeking wound care in the ED while an NP(W)-Led wound care service was available. Additionally, this study examined ED utilization before, during, and after implementing an NP(W)-Led wound care service. This study suggests a slight decrease in ED visits for wound care the NP(W)-Led wound service was open. The predictors for ED visits require further research.



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## Chapter 7

### 7 Thesis Discussion

This doctoral research was a three-part study that explored community patients' access to wound care in one area of Southwestern Ontario (Canada). The exploration involved 1) developing and implementing an NP(W)-Led community-based wound care service, 2) examining the experience of patients who received wound care through the NP(W)-Led community-based wound care service compared to those who received wound care in the emergency department (ED), and 3) examining the effect of an NP(W)-Led community-based wound care service on ED utilization.

A quality improvement project (QIP) involved obtaining extensive stakeholders' feedback to develop and implement an NP(W)-Led community wound care service. Within the NP scope of practice, the service provided advanced wound care to clients receiving community wound care services through the Local Health Integration Network (LHIN). The NP(W)-Led wound care service pilot took place two days a week over 12-weeks (June 12, 2017- August 31, 2017).

An existing community-based clinic with an onsite pharmacy, laboratory, and diagnostic imaging, offered space for the NP(W)-Led wound care service. Community nurses and the community clinic physicians referred patients for consultation and advanced wound care within the NP scope of practice. There were an onsite physician and pharmacist available for consultation as needed. A total of 112 patients over 117 visits attended the NP(W)-Led wound care service. Referrals included both open wounds (e.g., diabetic foot ulcers) and wound-related conditions (e.g., cellulitis). The NP(W)'s expanded scope included prescribing and administering medications, providing treatments (e.g., debriding wounds), ordering laboratory and diagnostic tests, and sending referrals to specialists. Most patients required one visit. Two patients received a referral to the emergency department (ED).

Retrospective chart audits completed on 2066 local LHIN charts examined the NP(W)-Led wound care service effect on emergency department (ED) utilization before, during,

and post-implementation of the service. There was a statistical difference between the total visits and visits for wound care at the two points, before-during and during-after the NP(W)-Led wound care service. Reductions in nonurgent wound care visits to ED were promising, but the numbers were small. Whether more substantial reductions in ED visits are achievable can only be determined if NP(W)-Led wound care service is available more often than two days a week, for longer than 12 weeks. This would ensure that all patients on local LHIN community wound service who need advanced practice, using specific referral criteria, can access the service as readily as ED. An examination of reasons for ED visits revealed that ED providers' and community nurses' current referral practices were the most common reasons for ED use. A future prospective study design would provide a more fulsome evaluation of these practices and decisions via interviews with patients and the ED providers. Additional ideas about how to change embedded practices will come after fully understanding underlying providers' decisions.

Patient experience with the NP(W)-Led clinic and the ED occurred via mail-in surveys based on a modified version of the Generic Short Patient Experiences Questionnaire (GS-PEQ). Forty-two percent of participants in the NP(W)-Led wound care service completed and returned the GS-PEQ contrasted with 7.5% from the ED. Respondents in both the NP(W)-Led wound care service and the ED indicated being satisfied with the care. The clinic used for the NP(W)-Led wound care service was accessible with no wait or a very short wait to receive care, contrasting with the ED where participants indicated a long wait before being admitted for service. Additionally, 82% of participants reported involvement in treatment decisions at the NP(W)-Led clinic compared to 67% in the ED. The scale used for this study reflected a general measure of patient experience but did not allow for a fine-grained analysis of patient experience with specific experiences with care.

Implementing the NP(W)-Led clinic provided access to advanced wound care to several patients in the local LHIN. This small study suggests this innovative service was associated with a high-level of patient satisfaction and decreased ED visits during the NP(W)-Led wound care service. Further research is warranted to determine if substantive changes to nonurgent ED use can be achieved and warrant a permanent NP(W)-Led

wound care service in this region. A strength of the NP(W)-Led wound care service was the demonstrated need for the service, based on the appropriate referrals. Community nurses referred patients who warranted an assessment or treatment within the NP(W) scope of practice, and the NP(W) discharged patients after completing care. There was no known waitlist as community nurses were aware that the service was only twice a week for 12 weeks.

The findings of this research add to the existing knowledge base regarding NPs and wound care practices. Additionally, this research provides new information for NP wound care practices specific to Canada. Healthcare systems and universal funding vary globally, as does the protected title and the regulation of the NP role. Global variations impact role implementation, making it difficult to generalize findings to Canada. Therefore, when implementing a new role, it is important to make global comparisons with countries, such as Australia, that have a universal healthcare system with a regulated and protected NP role. Likewise, examining the cost of wound care in countries that have a universal health care system may offer solutions to wound care challenges faced in Canada.

## 7.1 Limitations

There were several limitations in this three-part study. A limitation of the QIP was not using all the stakeholders' suggestions to implement the NP(W)-Led wound care service. Leadership at the local LHIN and the community clinic decided the referral process and resource allocation. The duration of the NP(W)-Led wound care service was another limitation of the study. The short pilot, lasting only three months, may have also limited the participation of some community nurses and patients who were seeking a more permanent solution for their chronic wound care needs. A permanent, funded, NP(W)-Led wound care service could incorporate all stakeholders' suggestions, and it may get additional participation from community nurses and patients who elected not to use the service.

Discharging patients who no longer required the NP(W)'s scope of practice meant many only had one visit; this prevented evaluation of the healing rate. Furthermore, the patients available to the community nurses may not have represented the general population. Future research should include a prospective controlled trial that is long enough to expect healing with patients randomized to a treatment group (NP(W)-Led) and a comparison group with standard care (local LHIN). Clinical outcomes should include healing rate, discharge from service, and a qualitative component to gather patient perspective.

There were limitations in the second study, which examined patient experience in the NP(W)-Led wound care service and the ED. Response rates from the ED were low; the small sample size makes it impossible to generalize findings.<sup>1</sup> The anonymous collection of the ED survey made it impossible to determine the non-responders; sending out another study to all participants could have resulted in participants completing more than one questionnaire, altering the results. Future studies should offer participant incentives<sup>2,3</sup> and reminders,<sup>3,4</sup> to improve participant response rates. Additionally, offering the survey by web and mail provides access to those who prefer completing surveys online. Future studies should use a researcher-blinded tracking system for returned surveys.

There were limitations in the third study, ED utilization before, during, and after implementing the NP(W)-Led wound care service. A single auditor raises the potential of bias by categorizing data so that fewer people attended the ED during the NP(W)-Led wound care service. To prevent this, the researcher had view-only access to charts of patients who went to the ED. Furthermore, the local hospital IT department coded patients as attending the ED and listed the reason for the visit. Having blinded reviews (to visit date) and multiple auditors would ensure the result's accuracy. Improving the data retrieval process through the LHIN would also make it easier to collect and analyze data.

The most significant limitation for this three-part study was the potential for bias created as the NP(W) had multiple roles, including researcher, creator and provider for the wound care service, the interviewer for QIP, chart auditor, and worked in the ED. The NP(W) was the interviewer and transcriber for the QIP, potentially causing interviewer, observer, or cultural biases. The interviewer may have preconceived ideas or opinions

about the topic,<sup>5</sup> impacting transcription and content analysis. Social desirability was also a concern as respondents may or may not answer truthfully based on the NP(W) being in the room. Also, community nurses and patients may feel obligated to provide positive responses to prevent impacting future care.<sup>6</sup> To reduce these biases, the NP(W) remained aware of their body language and tone. Likewise, patient stakeholders could complete and return a written questionnaire instead of participating in face-to-face interviews. Additionally, a research assistant reviewed the transcripts from the tape-recorded interviews and focus groups, verifying categories and confirming the study's findings. Future studies must use an interviewer who is not involved in developing the service or providing care to conduct interviews and condense transcripts.

Social desirability bias was created by the NP(W) providing care to participants and handing out the GS-PEQ. Patients may feel care will be withheld or impacted if they did not complete the survey and provide positive responses.<sup>6</sup> Objectivity was maintained by having research assistants enter all data from the NP(W)-Led clinic and the GS-PEQ questionnaires into excel spreadsheets to be uploaded into SPSS. In addition, the NP(W) handed out the GS-PEQ questionnaires to participants at discharge to complete and return anonymously. Handing out GS-PEQ to participants at discharge also provided an immediate opportunity to fill out the GS-PEQ to prevent recall bias. Future studies could also have a research assistant complete the questionnaire with the participant in a private room.

The small sample size for the ED respondents on the GS-PEQ and their characteristics can cause a response non-response bias, as responses may not be an accurate reflection of the general population. For instance, satisfied patients are more likely to respond than less satisfied,<sup>7</sup> and in small sample sizes, these characteristics can influence the results. Additionally, participants' characteristics, those less satisfied, that do not respond can create a non-response bias, impacting results.<sup>6</sup> Larger randomized studies reduce the impact of participant characteristics. Finally, convenience sampling, nurses sending available patients, can result in sampling bias as the group is not randomly selected and may not reflect the population of interest. Future research should randomize patients.

## 7.2 Future research

Future research should include prospective controlled trials long enough to expect healing and include objectives to examine predictors of healing. Randomization of patients needs to include a treatment group (standard care managed by NP) and a comparison group standard care provided through ESC LHIN. Measurements should be with a validated tool that measures consistently, such as the Photography Wound Assessment Tool. A mixed-method approach with a qualitative component will provide patients' perspectives. ED utilization research should include regression analysis to examine predictors of using the ED, including comorbidities, medications, gender, age, accessibility to alternate care (after hours, weekends, holidays), and previous ED visits. Regression analysis can control confounding variables of age, education level, marital status, and income level.

## 7.3 Future Implications for Health Care

The People's Health Care Act,<sup>7</sup> recently passed by the Government of Ontario, requires the development of Ontario Health Teams (OHTs). The OHTs will form a seamless, patient-centered healthcare system by consolidating acute and community services. NPs can be part of the seamless process by taking a leadership role in the process and development of OHTs to transition patients requiring wound care from acute to community care. NPs are in a unique position to provide patient care on OHTs. They can coordinate services on an interdisciplinary wound care team, transitioning patients from acute to community care. The formation of OHTs provides many opportunities for innovative delivery of health care services across Ontario. The NP(W) researcher was a member of the Registered Nurses Association of Ontario (RNAO) Nurse Practitioner Task Force Vision for Tomorrow.<sup>8</sup> Recommendations and actions released at Queen's Park Day on February 25, 2021, included a section on developing NP roles on Ontario Health Teams (OHT).



## Reference

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2. Yu S, Alper HE, Nguyen A-M, Brackbill RM, Turner L, Walker DJ, et al. The effectiveness of a monetary incentive offer on survey response rates and response completeness in a longitudinal study. *BMC Med Res Methodol* [Internet]. 2017 Dec [cited 2020 Nov 5];17(1). Available from: <https://bmcmedresmethodol.biomedcentral.com/articles/10.1186/s12874-017-0353-1>
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6. Christensen AI, Ekholm O, Glümer C, Juel K. Effect of survey mode on response patterns: comparison of face-to-face and self-administered modes in health surveys. *Eur J Public Health*. 2014 Apr;24(2):327–32.
7. Mazor KM, Clauser BE, Field T, Yood RA, Gurwitz JH. A Demonstration of the impact of response bias on the results of patient satisfaction surveys: A Demonstration of the Impact of Response Bias on Patient Satisfaction Surveys. *Health Serv Res*. 2002;37(5):1403-1417. doi:10.1111/1475-6773.11194
8. Government of Canada. (2019) [Internet]. 2019 [cited 2019 May 15]. Available from: <https://www.ontario.ca/laws/statute/s19005>.
9. Nurse Practitioner Task Force & Registered Nurses' Association of Ontario. (2021) [Internet]. [cited 2021 February 25]. Available from. Nurse practitioner task force vision for tomorrow. Registered Nurses Association of Ontario = L'association des

infirmières et infirmiers autorisés de l'Ontario. [https://rnao.ca/sites/rnao-ca/files/NP\\_TF\\_Feb\\_25\\_FINAL\\_3.pdf](https://rnao.ca/sites/rnao-ca/files/NP_TF_Feb_25_FINAL_3.pdf)

## Appendix A

### REB Study Approvals



**Western  
Research**

Western University Health Science Research Ethics Board  
HSREB Delegated Initial Approval Notice

**Principal Investigator:** Dr. Karen Campbell

**Department & Institution:** Health Sciences/Physical Therapy, Western University

**Review Type:** Delegated

**HSREB File Number:** 108999

**Study Title:** Healthcare initiative to evaluate the impact of outreach wound management provided by a nurse practitioner on patient emergency department utilization

**HSREB Initial Approval Date:** May 01, 2017

**HSREB Expiry Date:** May 01, 2018

**Documents Approved and/or Received for Information:**

Document Name	Comments	Version Date
Western University Protocol	Received April 20, 2017	
Other	Telephone Script	2017/03/13
Letter of Information & Consent		2017/04/28
Data Collection Form/Case Report Form	Generic Short Patient Experiences Questionnaire	2017/05/01
Data Collection Form/Case Report Form	Chart Review	2017/05/01
Data Collection Form/Case Report Form	Outreach Clinic	2017/05/01

The Western University Health Science Research Ethics Board (HSREB) has reviewed and approved the above named study, as of the HSREB Initial Approval Date noted above.

HSREB approval for this study remains valid until the HSREB Expiry Date noted above, conditional to timely submission and acceptance of HSREB Continuing Ethics Review.

The Western University HSREB operates in compliance with the Tri-Council Policy Statement Ethical Conduct for Research Involving Humans (TCPS2), the International Conference on Harmonization of Technical Requirements for Registration of Pharmaceuticals for Human Use Guideline for Good Clinical Practice Practices (ICH E6 R1), the Ontario Personal Health Information Protection Act (PHIPA, 2004), Part 4 of the Natural Health Product Regulations, Health Canada Medical Device Regulations and Part C, Division 5, of the Food and Drug Regulations of Health Canada.

Members of the HSREB who are named as Investigators in research studies do not participate in discussions related to, nor vote on such studies when they are presented to the REB.

The HSREB is registered with the U.S. Department of Health & Human Services under the IRB registration number IRB 00000940.



Office of Research Ethics  
 401 Sunset Avenue  
 Windsor, Ontario, Canada N9B 3P4  
 519-253-3000, ext. 3948  
[www.uwindsor.ca/reb](http://www.uwindsor.ca/reb) [ethics@uwindsor.ca](mailto:ethics@uwindsor.ca)

Today's Date: May 09, 2017

Principal Investigator: Ms. Sherry Morrell & Dr. Karen Campbell  
 REB Number: 34894

Research Project Title: REB# 18-074: "Healthcare Initiative to Evaluate the Impact of Outreach Wound Management Provided by a Nurse Practitioner on Patient Emergency Department Utilization "

Clearance Date: May 9, 2017

Project End Date: May 01, 2018

---

This is to inform you that the University of Windsor Research Ethics Board (REB), which is organized and operated according to the Tri-Council Policy Statement and the University of Windsor Guidelines for Research Involving Human Participants, has granted approval to your research project. This approval is valid for one year after the clearance date noted above.

An annual Progress Report must be submitted for renewal of the project. The REB may ask for monitoring information at some time during the project's approval period. A Final Report must be submitted at the end of the project to close the file.

During the course of the research, no deviations from, or changes to, the protocol or consent form may be initiated without prior written approval from the REB. Approval for modifications to an ongoing study can be requested using a Request to Revise Form.

Investigators must also report promptly to the REB:

- a) changes increasing the risk to the participant(s) and/or affecting the conduct of the study;
- b) all adverse and unexpected events that occur to participants;
- c) new information that may affect the risks to the participants or the conduct of the study.

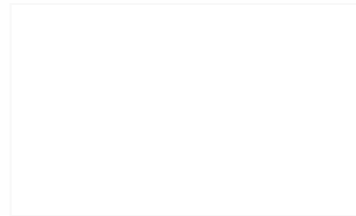
Forms for submissions, notifications, or changes are available on the REB website: [www.uwindsor.ca/reb](http://www.uwindsor.ca/reb). If your data are going to be used for another project, it is necessary to submit a secondary use of data application to the REB.

Sincerely,

## Appendix B

### Agency Support Letters

Grand Marais  
Urgent Care Clinic



March 23, 2017

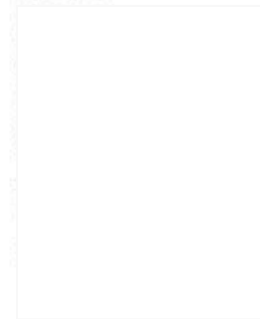
To Whom It May Concern

Re: Sherry Morrell RN (EC) MN MCISc-wound healing, PhD(c)

Grand Marais Urgent Care Clinic (GMUCC) is willing to support Sherry Morrell in her research project by allowing her to use space in our facility to manage community patients requiring wound care.

We do not have a Research and Ethics Board (REB) and are willing to accept recommendations from Western Universities REB. We look forward to working in conjunction with Sherry and her patients. We feel this clinic will be a great fit for Sherry and the patients that she cares for. Her expertise should be a good fit for this area that is lacking in this aspect of medicine.

If there are any questions, please do not hesitate to contact me.



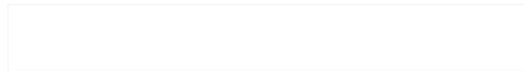
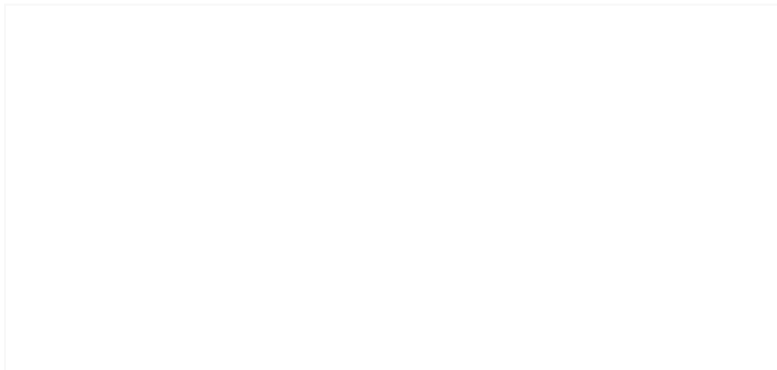
March 23, 2017

To Whom It May Concern:

Re: Sherry Morrell RN (EC), MN, MCISc -wound healing, PhD (c)

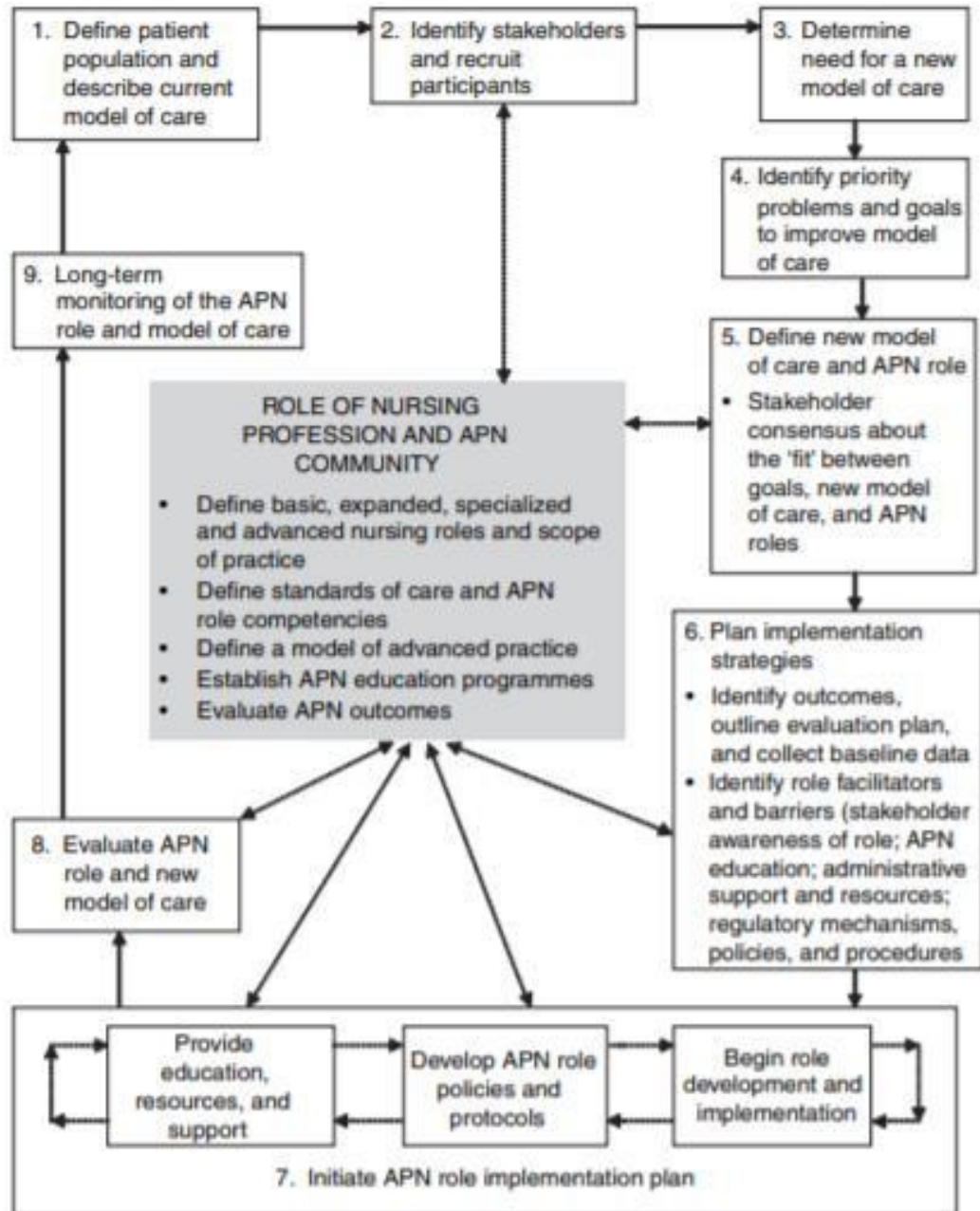
Please be aware that [redacted] Community Care Access Centre is willing to support Sherry Morrell in her research work related to community patients requiring specialized wound care.

She will have a *view only* access to patient files for those that she will receive referrals for. Communication with those caregivers in the circle of care could be facilitated with current or enhanced paper processes. Further, without having our own Research and Ethics Board, we are willing to accept recommendations from the Research Ethics Board (REB) from the University of Western Ontario.



## Appendix C

### PEPPA Framework



Reprinted from Bryant-Lukosius D, DiCenso A. A framework for the introduction and evaluation of advanced practice nursing roles. *J Adv Nurs*. 2004;48(5):530-540. doi:10.1111/j.1365-2648.2004.03235.x

## Appendix D

### REB QIP Letters

Email from

Project File No: REB# 108372

Project Title: Quality Improvement Project: Issues Related to the Current Use of the  
Emergency Department

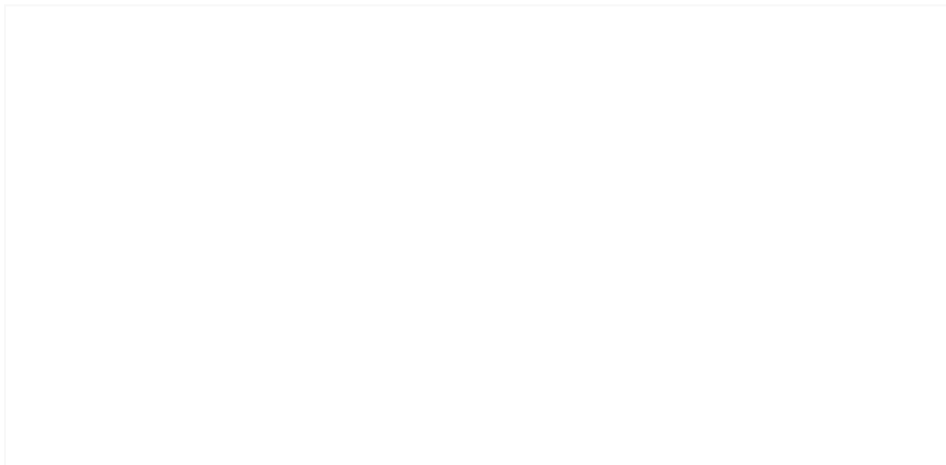
Principal Investigator: Dr. Karen Campbell

Committee: HSREB Delegated L2

Hello,

Upon review of the below noted submission this looks to be a program development without a specific research question. If this is the case, REB review is not required. I would recommend that you still obtain consent/permission from those individuals that participate in this.

Sincerely,





**From:** ETHICS

**Sent:** August 31, 2016 6:03:07 PM

**To:** Sherry Morrell

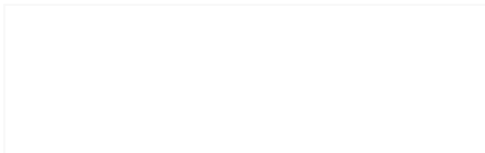
**Subject:** Re: RE: REB#108372 PI:

Hi Sherry,

I've reviewed the file and I agree that the main project appears to meet the criteria of exemption under TCPS2 2.5 program evaluation/quality improvement. For you to use the information for your thesis, which is a secondary use of the information, we would require a secondary use of data application. I see from the consent form attached that you already inform those who participate that the information will also be used for a publication and a thesis, so you can satisfy the criteria under TCPS2 5.5 for the secondary use of data.

When you have gathered the focus group and interview data and want to begin using the information as part of your thesis, please complete a secondary use of data form and submit it to the University REB. That application is cleared by the Chair and does not require committee review, so it is a pretty rapid review.

If you have any questions, or want to discuss this further, please feel free to be in touch with me. My direct extension at the REB office is #3709.



## Appendix E

### QIP Letter of Information

By signing this letter of consent, I am agreeing to become a stakeholder to participate in a quality improvement project that integrates stakeholder feedback to examine issues related to the current use of the emergency department for wound management. My stakeholder feedback will be utilized to develop a Community Wound Outreach Program including a plan and processes for sustainability. Individualized interviews and/or focus groups will be held to identify facilitators and barriers to the implementation of an outreach program and generate ideas to develop the CCAC Community Wound Outreach Program.

I have read the Letter of Information and am aware that participation is voluntary and my choice to participate (or not) will not influence any future treatment provided at the emergency department or any treatment provided through the Community Care Access Centre (CCAC). I am also aware that I will receive no compensation for participating in this project and that all information regarding stakeholder identifiers will remain confidential.

I meet the inclusion criteria being a person, group, or organization with a vested interest in the project. I am over the age of 18 and have no communication difficulties and I am able to communicate and read in English.

I am aware that interviews will be tape recorded and the tapes will be destroyed once they have been typed up. Stakeholder job titles will be recorded to correlate with stakeholder and will remain as a part of the final report. Individual names will not be collected or stated in the reported data. Stakeholder job titles will remain as part of the final data reported. A data collection tool will be used to relay stakeholder information regarding influence, support, opposition, level of vested interest, position or feedback.

Data will be collected using a Data Collection Table. The student investigator will use an encrypted Universal Serial Bus (USB) to collect data to transfer to a secure drive (J Drive) at the University. No personal identifiers will be retained as part of the data collection. All data will be destroyed 5 years after completion of the study. Data will be presented as findings of the project and published in an academic journal and/or presentation at a conference. At no time, however, will your name be used or any identifying information revealed.

I have read the above information regarding this research study which is a quality improvement project that integrates stakeholder feedback to examine issues related to

\_\_\_\_\_ (Printed Name) \_\_\_\_\_ (Signature) \_\_\_\_\_ (Date)

### Appendix F

## Medical Update Record

### Medical Update Request Form



Urgent Response Required (Same Day Criteria: IV Requests, ESAS Scores >5, SRK Request)

Physician / Health Care Provider: \_\_\_\_\_

CCAC Caseload: \_\_\_\_\_ Frequency of Visits: \_\_\_\_\_

Fax completed form to: \_\_\_\_\_

Agency

Fax Number

Patient Name: \_\_\_\_\_ DOB (dd/mm/yy): \_\_\_\_\_ BRN: \_\_\_\_\_

Diagnosis:

Allergies:

Present Status (Completed by Nursing Service Provider):

Signature	Print Name / Designation / Title
Agency / Extension	Date (dd/mm/yy)

Physician / Health Care Provider Response / Orders:

Signature	Print Name / Designation / Title
CPSO / CNO Reg. Number	OHIP Billing Code <sup>1</sup> Date (dd/mm/yy)

Service Provider Use Only:

Reviewed by Service Provider Initial: \_\_\_\_\_ Date (dd/mm/yy): \_\_\_\_\_

<sup>1</sup> Physician use only. Applicable billing as outlined in the Schedule of Benefits for Physician Services under the Health Insurance Act.

## Appendix G

### Study Letter of Information

**Project Title:** Healthcare Initiative to Evaluate the Impact of Outreach Wound Management Provided by a Nurse Practitioner on Patient Emergency Department Utilization.

**Principal Investigator:**

### Letter of Information

#### Invitation to Participate

You are invited to become a participant in research project that examines the impact of outreach wound management provided by a nurse practitioner on patient Emergency Department (ED) visits Your participation is highly valued.

#### Purpose of the Letter

The purpose of this letter is to provide you with information required for you to make an informed decision regarding participation as a participant in this research.

#### Purpose of this Study

This research will examine information regarding Community Care Access Centre (CCAC) patients receiving wound management through their usual outlets: Emergency departments, primary care providers, specialists, or other sources, in Windsor, Ontario (Canada). Once current practice is known, implementation of an NP CCAC outreach wound management program and its impact on ED utilization will be studied. This study will also evaluate the patient experience, with the Generic Short Patient Experience Questionnaire

1. **Inclusion Criteria:** persons 18 years or older
2. registered as a patient of the local LHIN to receive community wound care services
3. exhibiting an acute or chronic wound (diabetic foot ulcer, venous leg ulcer, arterial leg ulcer, pressure injury, or a wound related diagnoses)
4. requires wound management that falls within the scope of practice of a nurse practitioner

**Exclusion Criteria:**

1. persons that require urgent care in the Emergency Department or hospital admission
2. persons that refuse to participate
3. persons that are unable to communicate in English without a translator available
4. persons that have weight or mobility issues that prevent them from attending the NP(W) service
5. persons that do not have a contact phone number
6. persons that do not meet the inclusion criteria

**Study Procedures**

Patients that are registered with CCAC that meet the inclusion criteria will be given the opportunity of receiving wound management through the outreach facility. The home care nurse will be given a number to call for the participant appointment.

Pre-intervention Establish Baseline - A chart review of Community Care Access Centre charts will provide information to determine current practice for CCAC participants receiving wound management in Windsor, Ontario.

Intervention - A nurse practitioner, with advanced education in wound management, will provide standard care based on the scope of practice of a nurse practitioner and best practice guidelines for wound management. A physician will be available on-site for collaboration and consultation for any medications, diagnostics or treatments outside the scope of practice of a nurse practitioner.

Evaluation - All CCAC participants will be evaluated four weeks after completing the Intervention phase to determine the Post-intervention practice of wound management.

Demographics collected will include: age, partial date of birth (month/year), gender, address, marital status, and health coverage provider. Other patient information collected will include: arrival time, treatment time, reason for visit, comorbidities, and any medications known to affect healing. Consultation with physician will be documented along with the rationale for the consult. Documentation regarding the wound(s) will be classified as: diabetic foot ulcer, venous leg ulcer, arterial leg ulcer, pressure injury, or other. Wound characteristics will include, duration of wound, wound measurement, wound bed, exudate, periwound, and presence or absence of wound infection. Patient lifestyle factors known to affect healing such as smoking and alcohol will be documented along with diagnostic tests and medications ordered. Standard wound care will include, cleansing, debridement and dressings selection based on best practice guidelines. To understand the patient experience, the generic Short Patient Experience Questionnaire (GS-PEQ) will be conducted at discharge from care or at wound closure (reepithelization), whichever is first

Medication, procedures, laboratory and diagnostic tests ordered will be based on participant presentation and the scope of practice of an RN(EC). A physician will be available on-site for collaboration and consultation for any medications, diagnostics or treatments outside the scope of practice of a nurse practitioner.

### **Possible Risks and Harms**

There are no known or anticipated risks or discomforts associated with participating in this study. Risks associated with standard care are risks you would undergo even if you were not a research participant. A potential inconvenience to the participants would be the time taken to fill out the questionnaire.

### **Possible Benefits**

Emergency visit reductions and shorter wait times for wound management are a potential benefit to participants of this study and residents of Windsor, Ontario. Information learned from this study may help lead to improved wound management in Windsor Ontario, in the future.

### **Compensation**

You will not be compensated for your participation in this research.

### **Voluntary Participation**

You do not waive any legal right by consenting to this study. Your participation in this study is voluntary. You may decide not to be in this study, or to be in the study now and then change your mind later. You may leave the study at any time without affecting your care. We will give you new information that is learned during the study that might affect your decision to stay in the study. You may refuse to answer any question you do not want to answer on the questionnaire.

### **Confidentiality**

All data collected will remain confidential and accessible only to the investigators of this study. The student investigator will use an encrypted Universal Serial Bus (USB) to collect and store data. Once collected, the data will be transferred to a secure drive (J-Drive) at the University. A data analyst outside of the research team will be hired to analyse the data. They will have access to the research data that contains the participant identification number (ID) and does not contain personal identifiers. Personal identifiable information will be stored on a master list and kept separately from study data, except for partial date of birth (month/year), and initials, which will be linked to participant ID. All data will be destroyed 5 years after completion of the study. Representatives of the Health Sciences Research Ethics Board may require access to your study-related documents to oversee the ethical conduct of this study.

## **Contacts for Further Information**

### **Publication**

Study findings will be presented at the University. Study findings may be published in an academic journal, utilized to receive funding, or presented at conferences or workshops. If the results of the study are published, participants' personal identifiers will not be used. The student investigator may write an article later (within the 5-year period of data storage) which may contain information related to the data collected. Articles will be written about the same research questions as the current investigation and in alignment with the approved protocol.

Subsequent analyses will not be performed. If you would like to receive a copy of any potential study results, please contact

### **Consent**

The participant will sign a written consent below.

*This letter is yours to keep for future reference.*

Consent Form

Project Title: Healthcare Initiative to Evaluate the Impact of Outreach Wound Management Provided by a Nurse Practitioner on Patient Emergency Department Utilization

Study Investigator's Name:

I have read the Letter of Information, have had the nature of the study explained to me and I agree to participate. All questions have been answered to my satisfaction.

Participant's Name (please print): Participant's Signature: Date (DD-MMM-YYYY)

Parent / Legal Guardian / Legally Authorized Representative (if applicable)

Print: \_\_\_\_\_

Parent / Legal Guardian / Legally Authorized Representative (if applicable)

Signature: Date (DD-MMM-YYYY)

Was the participant assisted during the consent process? YES NO

If YES, please check the relevant box and complete the signature space below:

The person signing below acted as a translator for the participant during the consent process and attests that the study as set out in this form was accurately translated and has had any questions answered.

Print Name of Translator Signature Date (DD-MMM-YYYY)

Language

Person Obtaining Informed Consent (please print): \_\_\_\_\_

Signature: \_\_\_\_\_

Date (DD-MMM-YYYY) \_\_\_\_\_



## Curriculum Vitae

**Name:** Sherry Lynn Morrell

**Post-secondary Education and Degrees:**

St. Clair College  
Windsor, Ontario, Canada  
1986-1988  
Diploma Health Sciences/Nursing

University of Windsor  
Windsor, Ontario, Canada  
1994-2000  
Bachelor of Science in Nursing

University of Windsor  
Windsor, Ontario, Canada  
2000-2002  
Primary Health Care Nurse Practitioner Certificate

University of Windsor  
Windsor, Ontario, Canada  
2007-2008  
Master of Nursing Degree

Western University  
London, Ontario, Canada  
2008-2009  
Master of Clinical Science – Wound Healing

Western University  
London, Ontario, Canada  
2013-Present  
Doctor of Philosophy in Health and Rehabilitation  
Sciences, Measurements and Methods

**Honours and Awards:**

University of Windsor Certificate of Recognition for  
Preceptorship - received annually

St. Clair College Certificate of Recognition for  
Preceptorship - received annually

St. Clair College Certificate for Team Participation in  
Supporting Interdisciplinary Practice: The Family

Physician/Nurse Practitioner

Jean Mance Certificate Recognition for Excellence in Practice

**Related Work Experience:**

Lecturer-Faculty of Nursing  
University of Windsor  
2006-Present

Nurse Practitioner  
Grand Marais Urgent Care  
2020-Present

Registered Nurse-Nurse Practitioner  
Windsor Regional Hospital, Emergency Dept.  
2003-2020

Graduate Assistant, Masters Clinical Science Wound Healing Program  
Western University  
2013-2016

**Related Volunteer Experience:**

RNAO Nurse Practitioner Task Force – Vision for Tomorrow (2020-2021)

Surgical Site Infection Quality Standard Advisory Committee member 2020-2021  
Local Health Integration Network (LHIN) Steering Committee

ESC-LHIN Committee & Working Group - Foot Care (2019)

ESC-LHIN Working Group - Intravenous delivery (2019)

**Publications:**

Morrell, S., Campbell, K., Winberg, V., Walton, D., Houghton, P. Wound credentialling in Canada. *Wound Care Canada*. 15(1), 18-27. 2017

Morrell, S., Ralph, J., Giannotti, N., Dayus, D., Dennison, S., Bornais, J. Physical assessment skills taught in nursing curricula: A scoping review protocol. *JBISIRIR-2017-003981*. 2019

Pittman, G., Morrell, S., Ralph, J. Opioid prescribing safety measures utilized by primary healthcare providers in Canada: A scoping review. *Journal of Nursing Regulation*. 10(4), 13-21. 2020 [https://doi.org/10.1016/s2155-8256\(20\)30009-0](https://doi.org/10.1016/s2155-8256(20)30009-0)

Morrell, S., Pittman, G., Giannotti, N., Power H. Wound Management Provided by Nurse Practitioners: A literature review. *NP current*. 6 pages. 2020

Morrell, S., Giannotti, N., Pittman, G., McAlister, A. (in press) Physical assessment skills taught in nursing curricula: A scoping review . *JBI Database of Systematic Reviews and Implementation Reports*.

Morrell, S., Pittman, G., Giannotti, N., Mowbray, F. (submitted) Physical assessment skills: Are we adequately preparing graduate nurses. *Quality Advancement in Nursing Education*

### **Contributor publications books/reports:**

Lapum, J.L., St-Amant, O., Hughes, M., Petrie, P., Morrell, S., Mistry, S. *The Complete Subjective Health Assessment*. eCampusOntario. 2019. Available from <https://ecampusontario.pressbooks.pub/healthassessment/>

Nurse Practitioner Task Force. & Registered Nurses' Association of Ontario. (2021). *Nurse practitioner task force vision for tomorrow. Registered Nurses Association of Ontario = L'association des infirmières et infirmiers autorisés de l'Ontario.* [https://rnao.ca/sites/rnao-ca/files/NP\\_TF\\_Feb\\_25\\_FINAL\\_3.pdf](https://rnao.ca/sites/rnao-ca/files/NP_TF_Feb_25_FINAL_3.pdf)