

A NURSE PRACTITIONER'S EXPERIENCE USING REMOTE PRESENCE TECHNOLOGY
IN AN ISOLATED COMMUNITY: AN AUTOETHNOGRAPHY

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By

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ABSTRACT

There are many barriers to accessing healthcare services, particularly for people living in remote communities. Embracing innovation, such as remote presence technology (RPT), is one approach to reducing barriers. Innovations for healthcare service delivery can affect the care provided at the local level.

Research Question and Methodology

I examined the effect of RPT on healthcare service delivery in a remote community. Employing analytic autoethnography, I took a three-pronged approach, considering a systems level, patient care level, and nurse practitioner (NP) practice level.

Outcomes

Systems Level

In Saskatchewan, rural and remote dwellers experience a disparity in access to primary and specialist care, allied health professionals, and diagnostic services. Contributing factors involve the centralization of services, distance decay, transportation, and unfunded costs. Social determinants of health and systemic oppression contribute to the disparity. This results in patients receiving altered standards of care and poorer health outcomes.

Patient Care Level

RPT resulted in superior care provided to patients, resulting in a decrease in morbidity and mortality. Most patients were able to remain in the community rather than being transferred out, and patients and families were actively engaged with developing the care plan.

NP Practice Level

Working directly with specialists through collaboration, mentorship, and coaching enhanced NP work confidence and competence. Professional isolation and decision fatigue decreased. Challenges included not having access to the necessary providers, provider attitudes, inflexible policies, and having to shoulder the burden of care.

Conclusion

The introduction of RPT can have a drastic effect on the healthcare system, which is felt most at the local level. Patients can receive appropriate and timely care in their home community. NPs have a unique role working in remote healthcare settings. This model of care could have a significant influence on NP practice. Initiatives should be community-driven and responsive to match needs with services

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DEDICATION

This thesis is dedicated to the staff of Angelique Canada Health Centre and the community of Pelican Narrows, and to all the nurses and health care providers who work in northern isolated communities.

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LIST OF ABBREVIATIONS

AAP – Additional Authorized Practice
ACAL – Acute Care Access Line
AIDS – Acquired Immunodeficiency Syndrome
CA – Census Agglomeration
CBC – Canadian Broadcasting Corporation
CHA – Canada Health Act
CNA – Canadian Nurses Association
CNPE – Canadian Nurse Practitioner Exam
CMA – Canadian Medical Association
CMA – Census Metropolitan Area
CPS – Canadian Pediatric Society
CTAS – Canadian Triage Assessment Score
°C – Degree Celsius
ED – Emergency Department
FNIHB – First Nations and Inuit Health Branch
HEENT – Head, Ears, Eyes, Nose, and Throat (System)
HIV – Human Immunodeficiency Virus
HQO – Health Quality Ontario
IPC – Infection Prevention and Control
LGBTQ – Lesbian, Gay, Bisexual, Trans, and Queer
LPN – Licensed Practical Nurse
LRTI – Lower Respiratory Tract Infection
NMS – Northern Medical Services
NP – Nurse Practitioner
O₂ - Oxygen
PCP – Primary Care Paramedic
PDSA – Plan, Do, Study, Act
PHAC – Public Health Agency of Canada
RCMP – Royal Canadian Mounted Police
RN – Registered Nurse

RN(AAP) – Registered Nurse (Additional Authorized Practice)

RPT – Remote Presence Technology

RSV – Respiratory Syncytial Virus

SMA – Saskatchewan Medical Association

SRNA – Saskatchewan Registered Nurses Association

STC – Saskatchewan Transit Company

TMF – Transfer of Medical Function

URTI – Upper Respiratory Tract Infection

US – United States

U/S - Ultrasound

WHO – World Health Organization

PROLOGUE

“Hi! My name is Rachel and I’m a nurse practitioner. How can I help you today?” This is how I start every clinical encounter, and I’m proud to be able to utter those words. I am proud of who I am, what I am, and what I can do for others.

I recognize that being a nurse practitioner is a position of privilege. I had to work hard to become a nurse practitioner, but I benefitted from the ‘*system*’ that was designed to support me every step of the way. I was able to get a good education and a stable career with good earning potential and had very few obstacles in my way.

I have a lot of privilege. I am a white settler from European descent. Aside from my paternal grandfather who immigrated to Canada from England after World War II, the rest of my ancestors settled in Canada many, many generations ago – years, and decades in some cases – before Confederation in 1867.

I entered academia as a clinician and continued to work full-time while pursuing my master’s degree. My heart is in clinical work, but I have always appreciated the value of academia and through my work I wanted to contribute something to the field.

This thesis has been a long-term project, much longer than I intended, and has significantly evolved over the last nearly six years that I have worked on it. There are remnants from each phase and iteration that this thesis passed through, and I think it is important to show the growth and evolution of my perspectives and understanding along the way.

When I began this research, almost all of the literature on remote presence technology (RPT) was centred on the physician’s perspective. Now more research is starting to appear that brings the patient’s voice to the forefront. But, when I began, there was no research being done from the vantage point of the nurse working at the local level. In the end, I accomplished what I

had originally set out to do – leverage my own experience as a nurse practitioner using RPT in a northern isolated community.

The northern isolated community I was living and working in is a First Nations reserve. I want to honour this and acknowledge the power and privilege I had being a non-Indigenous nurse practitioner providing care in the community. Through the years I did a lot of work to make meaningful partnerships and to learn about the community, the culture, and their history. I have a profound respect for the community.

Because this research was being centered on my own perspective as a nurse practitioner, and the fact that I was not involving community members in this research, I made the conscientious decision not to make the focus on Indigenous health. Not because I don't think it's important, but because of *how* important I believe it is, and I knew I would not be able to do it justice. I am currently involved in several other projects that have meaningful community engagement and involvement at every level.

CHAPTER I: INTRODUCTION - ACCESS TO CARE AND REMOTE PRESENCE TECHNOLOGY

Universal access to care is a fundamental right for all Canadian residents (Canada Health Act, 1984). Despite this right being protected by the constitution, the reality of providing equitable access to health care services for all Canadians is challenging for a myriad of reasons, including the immense landmass, dispersed population, resource constraints, and sociopolitical constructs of colonization, racism, and discrimination. Remote presence technology (RPT) is one initiative that health care providers presently use in Saskatchewan to help overcome the disparity by increasing point of care access to physicians, specialists, and other health care providers and services across the province (Khan et al., 2017). RPT is a direct real-time audio and visual connection that enables virtual face-to-face encounters. Using RPT, providers can deliver a broad spectrum of services, including life-saving resuscitations, emergency care, urgent care, acute care, as well as routine and chronic care, in real-time and at the point-of-care of the patient.

This topic holds personal significance for me. For several years I worked as a nurse practitioner (NP) in a remote First Nations community in northern Saskatchewan, where I used RPT to connect with specialists in Saskatoon to receive clinical support in critical, urgent, and acute situations, and chronic care. Working with RPT transformed the care that I could provide to my patients. It was precisely due to the work that I was doing with RPT that brought me back into academics and inspired me to do this thesis. I have experienced first-hand the far-reaching benefits of using RPT for the patients, their families, the community, and the nursing team at our health centre. I believe that embracing innovation and technology to provide health care services could be a key factor for the health care system to enhance equitable access to care for

populations that traditionally have faced many barriers to receive the appropriate health care services.

1.1 Statement of the Problem

Many elements influence the accessibility of health care services. Health care is provided and administered at the provincial and territorial level and represents the single biggest program expenditure across the country (Barua et al., 2017). Governments have the difficult task of ensuring the adequate provision of health care services while maintaining the economic sustainability of the system. Centralizing services is one strategy used across Canada to optimize resources and efficiency (Barua et al., 2017). Unfortunately, the centralization of services effectively results in cuts to local services which disproportionately affects rural and remote residents (Fleet et al., 2013b).

In my own practice, I witnessed and experienced the difficulty of accessing the necessary services and care for my patients. Frequently, I was unable to get adequate support when I really needed it, and while I did my absolute best with the available resources, I knew that often my patients were not getting the same standard of care that they could receive in an urban setting. At times it could be overwhelming and isolating. There were situations that the lack of access to specialists and other services directly resulted in serious morbidities and even deaths. I may have had a heightened sensitivity to the profound disparity, as I had spent many years practicing in downtown Toronto and had the luxury of taking for granted the riches of services available in urban settings. These events often triggered an ethical crisis for me, knowing that a different outcome could have been possible if that patient were in a city, but because we simply did not have the resources available, nothing could be done. It is unacceptable to be complacent about it.

As innovations and new technologies, such as RPT, are introduced to mitigate the barriers to accessible health care services that exist in Saskatchewan, it is essential that we consider how these initiatives will address the specific needs in the various settings. It is also important to understand how RPT encounters can change the care provided to patients and how RPT affects the local providers.

1.2 Background

Many credible organizations have identified that the issue of equitable access to care is a human rights issue and is a priority for action. The World Health Organization (WHO) endorses the right to health for every human being, proclaiming that “the highest attainable standard of health [is] a fundamental right of every human being” (WHO, 2008, p. 29). Furthermore, the WHO recognizes that “the right to health includes access to timely, acceptable, and affordable health care of appropriate quality” (WHO, 2008, p. 4).

The Canadian Nurses Association (CNA) identifies equitable access as a key principle for health care transformation in Canada, noting “the health care system has a duty to Canadians to provide and advocate for equitable access to quality care and multi-sectoral policies to address the social determinants of health” (CNA, 2011, p. 2). Similarly, the Canadian Medical Association (CMA) put forward a position statement about ensuring equitable access to care and defined equitable access as “the opportunity of patients to obtain appropriate health care services based on their perceived need for care. This necessitates consideration of not only availability of services but quality of care as well” (CMA, 2014, p. 2). Both the CNA and the CMA have identified that despite the commitment for equitable access to care for all Canadians, inequalities to the access of quality care remain, which results in disparities in health outcomes (CMA, 2014;

CNA 2011). One means to bridge the gap to achieving equitable access to care is using telehealth and remote presence technology.

1.2.1 Feasibility Study

In 2014, Northern Medical Services (NMS), in consultation with the local community leaders and with support from the Saskatchewan Ministry of Health, selected the health centre I worked at to be a pilot site for RPT (Government of Saskatchewan, 2016). The selection of the community was related to the geographical isolation, the lack of services we had access to, and the nature and severity of the conditions with which we were faced (Government of Saskatchewan, 2016). We had ‘Rosie the Robot’, an RP7i© device from InTouch Health, and I began to use it to consult with a pediatric intensivist in Saskatoon to manage acutely ill children as part of a feasibility study.

The feasibility study began in response to the centralization of pediatric critical care services to Saskatoon. This centralization of services resulted in there being only one pediatric critical care program and one specialized pediatric transport team for the entire province. As a strategy to reduce the need for interfacility transfers, a pediatric intensivist would connect to RPT and work with the local health care providers to facilitate prompt assessment and intervention, potentially preventing the need to transfer the child to hospital (Holt et al., 2018). This became the new model of care for providing and delivering health care services to the children directly in the community.

Our feasibility study was small, but the results were compelling. Of the 38 patients seen by the specialist using RPT, we were able to prevent 24 interfacility transfers (Holt et al., 2018). This meant that 63% of the children were able to receive the care they required in their own community without having to be sent to the hospital. We also found that for the children who did

require a transfer, we were able to send nearly half of them to a regional centre, such as to Prince Albert or Flin Flon, rather than automatically sending them to a tertiary centre in Saskatoon (Holt et al., 2018). There was significant cost savings to the system, including \$240,000 in transportation costs alone, plus further savings such as prevented hospital admissions (Holt et al., 2018).

The results of the study surpassed our expectations, and the outcomes were so significant that the Ministry of Health invested \$2 million over four years to expand the project. I have since taken the clinical coordinator position for the Remote Presence Robotics Program. Most research done about RPT has focused on predominantly quantitative metrics, such as cost-savings, transportation, and patient outcomes. These are crucial factors to study and understand, however, it does not tell the whole story.

In the period that I was working in this northern community, I was the local champion for RPT. During the feasibility study I functioned as the site coordinator and was directly involved in approximately 85% of the encounters and was indirectly involved in the remaining 15% included in the pilot study. All these encounters were video recorded.

The objective of this thesis is to better understand the effect RPT has on the delivery of healthcare services in northern Saskatchewan and on the local providers. I will take a three-pronged approach to addressing this objective. First, I want to understand the barriers to health care services in the context of northern Saskatchewan, and to identify how the use of RPT can improve access to care for populations living in these communities. Second, I want to consider how the model of care using RPT can change patient care. Finally, I want to reflect on the effect this model of care has on the local providers, in particular, the NPs working in remote health settings.

I used videos from the feasibility study to explore the elements of the encounters and to identify factors that facilitated successful encounters and factors that acted as barriers in the encounter. I examined what elements occurred during the RPT encounters that would not have been possible in the traditional model of care and consider how this changed the care provided to patients. I also reflected on how this model of care changed my role and capacity as a local provider. I have a unique perspective of being an NP at the local site and being involved with the RPT program. Currently, there is minimal literature that has examined both aspects of RPT.

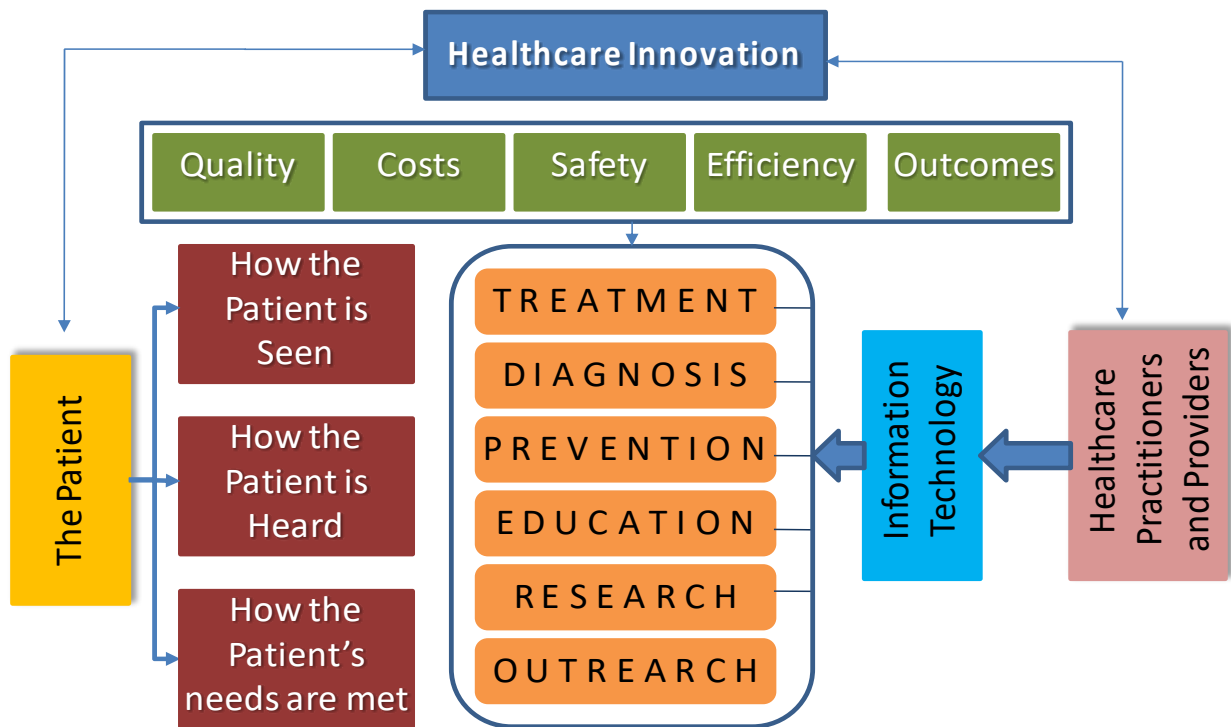
1.3 Conceptual Framework

There are several conceptual frameworks that relate to the concept of improving access to care, however, the primary focus of this thesis is to consider the effect of using RPT to improve access to care, as well as the impact the new model of health care service delivery has on the local providers. One framework captures these distinct elements more than the others: *Innovation in Healthcare Delivery Systems: A Conceptual Framework* (Omachonu & Einspruch, 2010). Omachonu and Einspruch (2010) identify six core purposes that health care organizations serve, including treatment, diagnosis, prevention, education, research, and outreach. The health care organizations must also consider and effectively maintain the variables of quality, cost, safety, efficiency, and outcomes (Omachonu & Einspruch, 2010). Generally, consumer needs drive innovation, first and foremost through the patients and health care professionals, but also other stakeholders, including health care organizations, government agencies, and consumer advocacy groups (Omachonu & Einspruch, 2010). On the other hand, the reverse can be true, where consumer needs can follow innovation, and it is useful to consider the primary catalyst for the innovation (Omachonu & Einspruch, 2010). The authors identify that information technology continues to be a primary factor in health care innovation. The ultimate outcome of health care

innovation is the impact on the patient, specifically “how the patient is seen, how the patient is heard, and how the patients’ needs are met” (Omachonu & Einspruch, 2010, p. 10).

In terms of my research, the innovation itself is not only the RPT device itself, but also the model of care using RPT to deliver health care services. RPT changes how health care professionals can offer treatment, make diagnoses, and provide illness prevention, education, research, and outreach. The need for improved access to care in rural and remote communities in Saskatchewan drives the innovation of using RPT to deliver health care services that otherwise would not be available.

Figure 1 A Conceptual Framework for Innovation in Healthcare (Omachonu & Einspruch, 2010)



There are two categories of innovation: nondisruptive and disruptive, which are based on the impact the innovation has on the stakeholders (Omachonu & Einspruch, 2010).

Nondisruptive innovation improves on existing products, processes, or structures in an evolutionary manner, whereas disruptive innovations are more revolutionary and upset the existing systems and have the potential to have a much more dramatic impact (Omachonu & Einspruch, 2010). It is reasonable to deduce that disruptive innovations will be much more challenging to implement; however, if a drastic change is required to address the specific problem, then taking a radical approach could result in the desired outcomes. There are four main types of innovation, including product innovation, process innovation, marketing innovation, and organizational innovation (Omachonu & Einspruch, 2010). Generally, innovations in health care are typically related to product, process, or structure.

Disseminating innovations remains a challenge, even when the initiatives are evidence-based and have been successfully implemented in other locations (Omachonu & Einspruch, 2010). Omachonu and Einspruch (2010) identify seven key factors for effective dissemination to take place are as follows:

- Formal mechanisms to find sound innovations that should be disseminated
- Find and support innovators
- Invest in early adopters
- Make early adopter activity observable
- Trust and enable reinvention
- Create slack (including resources) for change
- Lead by example (Omachonu & Einspruch, 2010, p. 15)

Disseminating innovations is a vital component to effect change, and this conceptual framework provides concrete strategies for knowledge translation. Policy makers can consider these

strategies, and in connection with the findings of this autoethnography, they can apply these lessons to practice.

Remote presence technology is a disruptive innovation that changes the way health professionals deliver care. The feasibility study demonstrated that RPT changes how the physicians see and hear the patient and how patients' needs are met. The results of the study establish that care provided using RPT is high quality, cost-effective, safe, efficient, and results in positive outcomes. Inherent to this model of care is that the health care practitioners and providers have to adapt to different roles and functions to deliver health care services, including treatment, diagnosis, prevention, education, research, and outreach.

1.4 Definitions

There are several terms in the emerging field of telehealth, including telecare, telemedicine, e-health, remote presence technology, and virtual care. Often these terms are interchangeable, and while there can be specific differences between the terms, these nuances are not widely agreed on, and there is not an established definitive definition. Additionally, for reference, in this thesis, the term *local site* refers to the location where the patient is, typically in a less serviced area such as a rural or remote clinic or health centre. Likewise, *local provider* refers to the health care professional working directly with the patient at the local site.

1.4.1 Telehealth/Telemedicine

Telehealth is the broad umbrella term for any health care service provided from a distance using information and communication technologies (Office of the National Coordinator for Health Information Technology, 2014). Service under the banner of telehealth can include remote clinical care, education for patients and providers, electronic health records, health information technology, administration support and much more (Office of the National

Coordinator for Health Information Technology, 2014). *Telemedicine*, on the other hand, falls within the scope of telehealth, however, it is more specific to direct clinical health care services provided from a distance (Office of the National Coordinator for Health Information Technology, 2014). The term telemedicine was coined in the 1970s and literally means “healing at a distance” (WHO, 2010, p. 8).

The WHO uses telemedicine and telehealth interchangeably, though they appear to favour the term telemedicine. They have adopted the following definition of telemedicine:

The delivery of health care services, where distance is a critical factor, by all health care professionals using information and communication technologies for the exchange of valid information for diagnosis, treatment and prevention of disease and injuries, research and evaluation, and for the continuing education of health care providers, all in the interests of advancing the health of individuals and their communities. (WHO, 2010, p. 9).

Historically, the term telemedicine was specifically for telecare provided by physicians, however, it is widely accepted that this practice has expanded out of the sole domain of medicine and now extends to all health care disciplines. There is appreciable controversy with the term telemedicine as it can be associated with the historical context of being physician-centric, and some do not feel that the more comprehensive definition does enough to encompass other health care disciplines. Ultimately, while the term telehealth is more inclusive, others argue that it is too broad of a term and does not capture the clinical component the same way that telemedicine does.

It is useful to note that organizations sometimes use the terms telehealth and telemedicine as the name for specific programs. For instance, Telehealth Saskatchewan, typically referred to as just Telehealth, is an eHealth Saskatchewan program referring to a particular network of video-conferencing

technologies (eHealth Saskatchewan, 2019). While the term telehealth is a generic term and, in Saskatchewan, most people associate the term with the provincial Telehealth program to the exclusion of other technologies and initiatives.

As this field grows at the international level, it will be helpful to have established terminology that is inclusive, and to develop universal definitions, as having different interpretations for the same terminology creates confusion. For the purpose of this thesis, the term telehealth will be the preferred term; however, when referencing existing literature, I will use the terminology used by the authors in the articles if appropriate.

1.4.2 Remote Presence Technology

Remote Presence Technology is one example of a technology that falls within the scope of telehealth by enabling real-time access to health care providers from a distance. Providers from a distant site can connect and be ‘present’ at the remote site using robotic technology, enabling ‘face to face’ interaction from a distance, performing assessments and directing care management to patients in remote locations (Government of Saskatchewan, 2017a). The functions of the robot allow the distant provider to navigate the robot autonomously, and the devices are equipped with high-resolution cameras that can pan, zoom, and tilt, and often have various peripheral attachments to aid in assessments, including stethoscopes, dermatoscopes, and ophthalmoscopes, among others (Lovo Grona et al., 2017). Health care providers currently use RPT across Saskatchewan, in remote nursing stations and health centres, as well as urban settings, such as long-term care facilities and within tertiary hospitals.

1.4.3 E-Health

E-Health (or eHealth) is a term related to electronic communication, computer-based support, and health systems management for health care service to “enable the sharing and use of information to deliver health care to deliver and promote health” (Norwegian Centre for Integrated Care and

Telemedicine, 2013). Examples of eHealth include ‘web-enabled’ transactions, medical informatics, and the use of information and communication technologies for global health promotion, health care, information dissemination for health professionals and the public, research, and surveillance, et cetera (Norwegian Centre for Integrated Care and Telemedicine, 2013). The potential applications are almost limitless.

1.4.4 Virtual Care

Virtual Care is emerging as the preeminent inclusive term encompassing any form of patient care that occurs remotely using any form of communication or information technology (Canadian Medical Association, 2019). Virtual care can refer to direct patient care, as well as indirect care such as care coordination with family members or other providers for the purpose of optimizing the quality of patient care (Canadian Medical Association, 2019). Virtual care can be as extensive as performing telerobotic surgery on a patient across the world, or as simple as sending a text message to a patient or family member in the next room.

1.5 Research Question

Three primary research questions serve as the foundation for my research.

1. What are the challenges of providing equitable access to care in Saskatchewan and the consequences of the disparity and how does the use of RPT can help mitigate these challenges?
2. What effect does the use of RPT have on the delivery of health care services in rural and remote communities?
 - a. What elements can occur during RPT interactions that would not have been possible in the traditional model of care?

- b. What elements contribute either to successful encounters, or serve to hinder the success of the encounter?
3. How does the use of RPT impact the NP's practice?

To answer these questions, I prepared a manuscript-based thesis. The first manuscript is a review of the literature on access to care. When considering how providers can use RPT to improve access to care, it is imperative first to understand what creates the barriers to accessing care, and what effects these barriers have on health outcomes. This evidence can inform us on how to best leverage RPT to address the specific needs of people in Saskatchewan effectively. In this paper, I examined the barriers to equitable access to care in Saskatchewan and identified the consequences of the disparity. Emphasis is on barriers specific to northern and isolated communities in Saskatchewan. Finally, I considered how the use of RPT could help mitigate these barriers in a meaningful way.

The second manuscript is a two-part autoethnography that involves a more in-depth qualitative analysis of how the use of RPT can change patient care and how it affects the local NPs. As a disruptive innovation, the introduction of the RPT devices can have a drastic effect on the whole health care system, which the local health centres feel the most. The fact that the use of RPT prevented interfacility transports for nearly two-thirds of the patients during the feasibility study infers that the use of RPT shifts the burden of care to the local level. NPs have a unique role working in rural and remote health care settings, and this model of care could have a significant influence on their practice.

1.6 Conclusion

Equitable access to care is a constitutional right for Canadian residents. However, there are many established barriers to accessing health care services, particularly for people living in northern and isolated communities. Embracing innovation and technology is one approach to reducing these barriers.

Understanding the causes and effects of the disparity in access to health care services in Saskatchewan will help inform how we can use RPT to address the specific needs in the province. Exploring how remote presence technology can impact the local providers, specifically NPs, will give us a deeper understanding of the impact this model of care can have. Ultimately, this research can help inform policies and support a more robust remote presence robotics program.

CHAPTER II – LITERATURE REVIEW

2.1 Prologue

In Chapter II, I address the first question: *What are the challenges of providing equitable access to care in Saskatchewan and the consequences of the disparity and how does the use of RPT can help mitigate these challenges?* My intention is to frame the problem to which I am applying the conceptual framework to address using RPT as a health care innovation. I give an overview of Canada's health care system, and specifically examine the issues of access to care in the North.

Please note that I will be using the term Indigenous, unless it is in specific reference to something from the literature, in which case I will use the language from the original publication.

2.2 Access to Care and Remote Presence Technology

Inequitable access to health care services is an essential issue in Canada (CNA, 2011). According to the Canada Health Act (CHA), all Canadian residents have the right to universal access to health care services, regardless of geographic location or ability to pay (CHA, 1984). However, the realities of large landmass, a dispersed population, fiscal constraints, and sociopolitical factors make it challenging to ensure health care services are accessible for all Canadians, particularly for those living in rural and remote communities.

In Roy Romanow's seminal report *Building on Values: The Future of Health Care in Canada* (2002), he identified that:

People in rural and remote communities have poorer health status than Canadians who live in larger centres. Access to health care is also a problem, not only because of distances but because these communities struggle to attract and keep nurses, doctors and other health care providers (p. 159).

Furthermore, not only do rural citizens experience poorer health, but they are also at a higher risk for trauma and have a higher incidence of mortality as a result of trauma, and have reduced access to emergency care (Fleet et al., 2013a). This is particularly concerning given that trauma is the number one cause of death of Canadians under 40 years of age (Statistics Canada, 2018a).

In theory, the intention of the CHA is to ensure equitable access to care, whereby “in an equitable system those with equal need will have equal utilization rates (horizontal equity) and those with less need will have lower utilization rates (vertical equity)” (Sibley & Weiner, 2011, p. 2). Knowing that people residing in rural communities experience poorer health status, compounded with a lack of services available, it becomes apparent there is poor equity in utilization rates in our health care system. The system is not working for everyone.

The use of remote presence technology (RPT) is one initiative that is rapidly gaining traction in Saskatchewan to help combat the disparity in access. The use of RPT is an innovative model of health care service delivery that increases point of care access to physicians, specialists, and other health care providers' services across the province. The consulting provider can connect from anywhere there is an internet connection, and they can see the patient in the most appropriate setting when the care is needed.

As this initiative is being implemented in Saskatchewan, it is vital to understand the barriers to accessible care, and effects of the barriers on health, and then use that knowledge to determine how to best leverage RPT to address the specific needs of people in Saskatchewan effectively. In this paper, I examine the challenges of providing equitable access to care in Saskatchewan and identify the consequences of the disparity. I consider the barriers to accessing different services in rural and remote communities and identify some contributing factors that rural and remote residents may face when trying to access those services. I also explore how social structures, such as social determinants of health and systemic oppression, can compound the challenges for individuals to access care. I then review how these barriers to care can alter the standards of care that patients receive. Finally, I consider what role RPT can play in addressing the disparity in access to care.

2.3 Background

Canada is a geographically expansive country with a landmass of about 9,000,000 square km, making it is the second-largest country in the world (Statistics Canada, 2018b). Even with a population of 35,000,000, due to the size of the country, the population density is quite low at only 3.9 person/square km (Statistics Canada, 2018b). The population density itself does not paint a complete picture, as over 83% of Canadians live inside a census metropolitan area

(CMA) or census agglomeration (CA) (Statistics Canada, 2018b). This means that approximately 17% of Canadians reside in rural or remote areas, sparsely populated across the vast geography of this country (Statistics Canada, 2018b).

Furthermore, while 75% of the Canadian population live within 161 km (100 miles) of the US border fewer than 150,000 people live in northern and remote communities (Federation of Canadian Municipalities, 2016; National Geographic, n.d.). The northern and remote communities encompass the three territories, including Nunavut, the Northwest Territory, and the Yukon Territory, Labrador, and the northern regions of the six most western provinces, from Quebec through to British Columbia (Federation of Canadian Municipalities, 2016).

2.3.1 Saskatchewan Demographics

Saskatchewan is a vast prairie province, roughly the same size as France. It has a landmass over 650,000 square km and a population of about 1,100,000, (Statistics Canada, 2018b). At 1.9 people per square km, Saskatchewan has the second-lowest population density of all the provinces and is less than half the national average (Statistics Canada, 2018b).

In Saskatchewan, the two largest cities – Saskatoon and Regina respectively – are located in the southern one-third of the province. Approximately half of the provincial population resides in one of these two cities (Statistics Canada, 2018b). If we include all the other CMAs and CAs in the province, it still only represents less than 65% of the population (Statistics Canada, 2018b). That means an astounding 35% of the population live in rural or remote areas, which is double the national average (Statistics Canada, 2018b).

Understanding the demographics and the population distribution is relevant to put into context the barriers that Saskatchewan residents may have accessing health care services. It is important to acknowledge that Saskatchewan includes the land of six different Treaty territories

consisting of Treaties 2, 4, 5, 6, 8, and 10. Over 16% of the population of Saskatchewan self-identify as Aboriginal, compared to less than 5% of the total population of Canada (Statistics Canada, 2017a). Approximately two-thirds of the Indigenous population self-identify as First Nations, of whom nearly half (47.5%) live on reserve (Government of Saskatchewan, 2017d).

Taking a deeper look into the demographics of Saskatchewan, fewer than 40,000 people inhabit the northern half of the province (Population Health Unit, 2016). This represents only 3.4% of the population. Remarkably, over 85% of the residents in northern Saskatchewan identify as Aboriginal, including First Nations, Metis, and Inuit Peoples (Population Health Unit, 2016). This high rate is comparable to the population living in Nunavut (Indigenous Services Canada, 2020). The northern population is younger and growing more rapidly than the general population in Saskatchewan (Indigenous Services Canada, 2020; Population Health Unit, 2016). Understanding who is living in northern Saskatchewan is particularly relevant as we consider barriers to health care services.

2.3.2 Canada Health Act (CHA)

In 1984, the government of Canada passed into legislation the CHA that guarantees access to health services for all Canadian Citizens (CHA, 1984). The five pillars of the CHA include public administration, comprehensiveness, universality, portability, and accessibility (CHA, 1984). These pillars form the foundation for the provinces and territories health policies and legislation for their insurance programs to receive federal funding (CHA, 1984). While most of health care delivery is under the jurisdiction of the provinces and territories, the federal government remains responsible for administering health care services for particular groups, including First Nations and Inuit per the Treaty agreements, as well as eligible veterans and inmates in federal penitentiaries (Government of Canada, 2019a).

According to the CHA, all Canadians are entitled to receive “reasonable and uniform access to insured health services, free of financial or other barriers” (CHA, 1984). Romanow (2002) identified that most Canadians, spanning across the political spectrum, overwhelmingly supported the notion that all citizens are entitled to healthcare. In many ways, the CHA has become a defining feature and a source of national pride and identity for Canadians. As much as it is a source of national pride, there are significant challenges to achieving equitable access to care to all Canadians.

2.3.3 Health Care Funding

The provincial and territorial governments provide and administer health care services governed by the tenants of the CHA, and health expenditures represent the single largest budget line across the country (Barua et al., 2017). In 2016, health care spending consumed, on average, 40.1% of provincial program spending, up from an average of 37.6% in 2011 (Barua et al., 2017). Saskatchewan spends among the lowest of the provinces on health care, contributing only 37.4% of its budget in 2016, up from 34.9% in 2011 (Barua et al., 2017). The relatively low spending on health care in Saskatchewan may be attributed to the sizeable Indigenous population, who have their health care costs covered by the Federal government through the First Nations and Inuit Health Branch (FNIHB).

It is reasonable to assume that the cost of health care will continue to increase given the historical trend, coupled with a growing and ageing population. An increase in expenditure on health care services will predictably come at the expense of other services the province delivers. Depending on the budget cuts, seemingly unrelated services could have an adverse effect on health, particularly for those who are most vulnerable. To illustrate this concern, take the decision the Government of Saskatchewan made in 2017 to eliminate the Saskatchewan

Transportation Company (STC), which was the sole provincial public transit system (Government of Saskatchewan, 2017c). There is already an abundance of anecdotal evidence that demonstrates the hardships this policy decision has had on people and communities such as inaccessibility to medical appointments, and inconsistent deliveries of medications and supplies to rural communities (STC Stories, 2019). This creates more disparity in accessing health care services for rural and remote residents.

2.4 Barriers to Care – Access to Services

When discussing barriers to care, it is useful to consider the different levels of services that patients typically access as part of regular health care. Primary care generally falls within the domain of family physicians or NPs, who frequently work with other disciplines to provide comprehensive care at the first point of entry into the health care system (eHealth Ontario, n.d.). Specialists offer a higher level of care at the secondary, tertiary, and quaternary levels (eHealth Ontario, n.d.). Allied health professionals, such as physiotherapists and pharmacists, have a significant role in providing services at all levels of care. Diagnostic services are often the cornerstone of making definitive diagnoses and determining the appropriate care, making it an essential component to accessible care (Fleet, et al., 2018).

2.4.1 Primary Care

Primary care is typically the first point of contact most people have with the health care system. Primary care encompasses a broad scope of services, including health promotion, wellness care, and prevention and treatment of illnesses and injuries (eHealth Ontario, n.d.). The recruitment and retention of primary health care providers in rural areas is a long-standing challenge faced in Saskatchewan and across Canada (Bath et al., 2015). In Saskatchewan, only 13.8% of physicians are practicing outside of a CMA or CA, despite over 35% of the population

residing in the same area (CMA, 2017). The increased utilization of NPs has had a positive effect on improving access to primary care services in rural regions in Saskatchewan, though a significant disparity still exists along the rural/urban divide (Shah et al., 2017).

A reassuring finding from two recent studies revealed that most people living in Saskatchewan do have some degree of access to a physician or NP, however the range of services available is narrower for rural residents, as compared to their urban counterparts (Bath, et al., 2015; Karunanayake, et al., 2015). Many rural and remote communities rely on visiting physicians and are more likely to see a different provider each time, which impedes optimal continuity of care (Karunanayake, et al., 2015). Outside factors such as weather and provider shortages, can further hinder the frequency of these visits.

2.4.2 Specialist Care

Inequitable access to specialist care is more pronounced in rural and remote settings, leading to adverse health outcomes for residents in communities further away from larger health centres (Harrington et al., 2013; Karunanayake et al., 2015; Sibley & Weiner, 2011). Primary care providers act as gatekeepers to accessing specialist care; while individuals can self-refer to a family physician or NP, they require a referral to a specialist (Harrington et al., 2013). The disparity of access to primary care services further increases the disparity in accessing specialist care (Harrington et al., 2013).

Researchers identified travel distances and wait times as significant barriers to accessing specialist care (Harrington et al., 2013; Karunanayake, et al., 2015; Sibley & Weiner, 2011). Among 11 commonwealth countries, Canadians experience the longest wait times to see a specialist, and the wait times have been consistently increasing (Karunanayake et al., 2015). In

Canada, nearly one-quarter of rural dwellers requiring specialist care report difficulty accessing that care (Karunanayake et al., 2015).

2.4.3 Allied Health Professionals

Many health disciplines outside of medicine and nursing provide essential care and are invaluable members of the health care team (Hunter-Orange et al., 2004). There are 32 different health professions represented by the Health Sciences Association of Saskatchewan, including physiotherapists, occupational therapists, pharmacists, speech and language pathologists (SLP), Emergency Medical Services (EMS), and social workers, to name but a few (Health Sciences Association of Saskatchewan, 2018). Care provided by allied health professionals (AHP) contributes to improved health outcomes and can have a significant impact on quality of life (Hunter-Orange et al., 2004).

Unsurprisingly, residents in rural areas have less access to the services provided by AHP compared to people residing in urban centres. For instance, only 11% of physiotherapists work in rural Saskatchewan and report a more generalized practice (Bath et al., 2015). This contrasts with evidence that the need for physiotherapist services is higher in rural areas; for example, residents in rural communities are 30% more likely to suffer from chronic back pain – a condition that can negatively affect quality of life and which physiotherapists can manage effectively (Bath et al., 2015).

Stroke is a major cause of morbidity and mortality in Canada, and a person having a stroke requires rapid access to specialized care. EMS can provide safe transportation to an appropriate stroke centre; however, rural patients are less likely to be transported to the hospital by ambulance (Koifman et al., 2016). After an acute stroke, health disciplines such as physiotherapy, occupational therapy, and SLP are essential to effective rehabilitation (Koifman

et al., 2016). Patients from rural areas are much less likely to access any of these services, compared to their urban counterparts (Koifman et al., 2016; Fleet et al., 2018).

2.4.5 Diagnostic Services

Diagnostic services such as CT scanners, MRI, laboratory, and basic X-ray facilities often form the basis for making a definitive diagnosis and determining the safe management of many health conditions (Fleet et al., 2018). The trend to centralize services have included many of these essential diagnostic services, reducing the ability for rural providers to provide safe and timely care on-site (Fleet et al., 2013b). This means that even when there are competent practitioners present who can provide the care, they remain unable to do so safely due to inadequate access to equipment.

In Canada, only 11% of rural hospitals have access to on-site CT scanners, and only 1% have MRI services (Fleet et al., 2018). While 94% have laboratory access and 92% have radiology, this still leaves a large population who do not have access to even these most basic and essential services (Fleet et al., 2018). It is worth noting that in Saskatchewan, particularly in the north, many of the community health centres are nursing stations, rather than hospitals, and are not represented in these statistics. It is not a far reach to recognize that the lack of access to diagnostic services can have a direct impact on the safety and timeliness of receiving appropriate care and ultimately affect the health outcomes for rural dwellers.

2.5 Barriers to Care – Contributing Factors

A myriad of factors creates barriers to accessing care. Limited resources are a significant consideration. Some resources are finite, such as an absolute number of qualified specialists. Access to other resources may be limited due to the determination of resource allotment, such as how diagnostic services and technologies are dispersed. It is difficult to consider each component

in isolation as the issues are often multifaceted and intertwined. Not only are there multiple factors creating barriers to access to care, but the factors intersect compounding the effect.

2.5.1 Centralization of Services

Governments face the challenge of balancing the provision of health care services in accordance with the CHA, and the ongoing economic sustainability of maintaining the system. In an effort to try to contain resources (both fiscal as well as human), a natural course of action is to centralize services (Barua et al., 2017). The consequence of the centralization of services results in cuts at the local level creating a greater paucity of health care services for rural residents (Fleet et al., 2013b).

Health care services in Saskatchewan are appreciably centralized. In 2017, the Government of Saskatchewan announced that it would be consolidating the 12 regional health authorities (RHA) into the single province-wide Saskatchewan Health Authority (Government of Saskatchewan, 2017b). The government made this move to improve efficiencies, minimize redundancies and to better coordinate the health services provided across the province (Government of Saskatchewan, 2017b). Effectively, this move further consolidated and centralized the health care services in the province.

2.5.2 Distance Decay

Providing universal and accessible healthcare to the people residing in rural settings can be challenging (Seidel et al., 2006). A distance of 50km or more from a tertiary healthcare center has a negative impact on health outcomes (Seidel et al., 2006). Patients who require specialist care typically have to travel to urban settings to receive the necessary care, increasing the burden on the patient, and can come at a high cost to the healthcare system (Campbell et al., 2012). The effects of this ‘distance decay’ are fewer services being offered, available, and used, resulting in

patients receiving altered standards of care (Seidel et al., 2006). For example, by the time rural patients access surgical care, their condition tends to be more urgent, compared to the acuity levels seen with their urban counterparts (Seidel et al., 2006).

In Saskatchewan, there are only six tertiary level hospitals and they are all located in either Saskatoon or Regina, including the new dedicated children's hospital that opened in Saskatoon in September 2019. According to the 2016 census, 48% of the provincial population lives in these two CMA's, the implication being that over half of the population may be impacted by the distance decay (Statistics Canada, 2017b). With Saskatoon being the northern-most centre providing tertiary level care, the catchment area is massive and includes communities over 1,000km away.

The direct effects of centralization and distance decay can be profound. For example, after cuts to a rural British Columbia hospital and the centralization of emergency services to a community 74 km away, mortality rates went up exponentially (Fleet et al., 2013a). Before the health cuts, this hospital ranked fourth in the province; after the cuts, it dropped to the last place (out of 47) related to "failure to rescue" (Fleet et al., 2013a). The need to transport patients results in delayed access to definitive care and altered standard of care (Fleet et al., 2013a).

2.5.3 Transportation

The centralization of services has resulted in rural residents having to travel further to access the necessary health care services, resulting in a delay in receiving definitive care (Fleet et al., 2013b). Emergency patient transfers are a particularly resource-heavy process and can cause strain on the local site, the referral health centre, and transfer systems (Rourke & Kennard, 2001).

Interfacility transports require careful planning and management before, during, and after the transfer to ensure the safety of the patient and the team (Rourke & Kennard, 2001). Effective communication and collaboration between the local and referral sites, as well as the transport team, is vital. Outside factors, such as road and weather conditions, can further complicate the safety of interfacility transfers.

The time during interfacility transport can be a particularly vulnerable period for the patient. Adequate clinical judgment is essential to diagnose, manage, and stabilize the patient's condition enough for a safe transfer (Rourke & Kennard, 2001). This becomes much more difficult when local centres are lacking the necessary diagnostic services and expertise on-site. Depending on the condition of the patient, often a health care provider is required to accompany the patient on the transport. One study from Ontario found that for interfacility transfers, a physician was required to attend about 6% of the cases, and a nurse attended another 25% of the transports (Rourke & Kennard, 2001). Interfacility transports requiring a local health care provider to attend can leave the community in a precarious situation. A recent study from Manitoba discovered that interfacility transports of critically ill pediatric patients caused 60% of the rural emergency departments to either close or alter their staffing complement to only a registered nurse leaving the community vulnerable (Hansen et al., 2017).

Another study examining emergency transfers from rural emergency departments in Ontario revealed that 37% of the patients transferred were sent for medical treatment (non-surgical), over half of whom required services from one of three disciplines: pediatrics; neurology; and general internal medicine (Rourke & Kennard, 2001). Nearly 20% of all patients transferred were specifically sent for diagnostic imaging, the majority of whom (14.1%) required a CT scan (Rourke & Kennard, 2001). Local access and support from pediatric, neurology, and

internal medicine services could facilitate management closer to home and having CT scanners on site would further reduce the need for transfer (Rourke & Kennard, 2001).

In Saskatchewan, pediatric critical care was centralized to a single centre in Saskatoon. A specialized pediatric transport team is responsible for responding to, and transporting all potentially critical pediatric cases across the province (Holt et al., 2018). Given the cost to transport a pediatric patient in Saskatchewan is about \$10,000 (Holt et al., 2018), it is unsurprising that the over \$72 million is spent annually on medical transportation in Saskatchewan alone (Government of Canada, 2019b; Government of Saskatchewan, 2019).

2.5.4 Unfunded Costs

The Canadian health care system ensures all residents can access any necessary health care services, free of charge (CHA, 1984). Insurable health services include, but not limited to, physician and specialist care, surgeries, and hospital stays. This means that a Canadian resident does not have to pay to see a doctor or to have a necessary surgery or to stay in the hospital (CHA, 1984). However, it does not mean that all costs associated with accessing the health services are covered. Unfunded costs refer to the out-of-pocket expenses that patients must pay in order to obtain the services that are insured. These unfunded costs are substantially higher for patients residing in rural areas compared with urban residents (Robb & Clapson, 2014). Robb and Clapson (2014) quantified the unfunded costs to patients requiring plastic surgery for one of three common, non-cosmetic procedures, including mandibular fracture repair, breast reduction, and carpal tunnel release. The researchers compared the direct costs for patients living in three different locations in Saskatchewan including Saskatoon, Prince Albert, and La Ronge, and included the consultation, operation, and any necessary follow-up based on the standards of care (Robb & Clapson, 2014).

The results were staggering. For all three procedures, patients living in La Ronge had unfunded costs at least 30x higher than patients residing in Saskatoon. For example, using private transportation, a patient living in Saskatoon requiring a breast reduction might pay \$90.00 for out-of-pocket expenses (Robb & Clapson, 2014). In contrast, the cost to a patient living in Prince Albert is \$1,259.04 and a patient living in La Ronge would have to pay \$2,733.96 (Robb & Clapson, 2014). The use of public transportation reduced the unfunded cost to the patient in the two northern communities by more than half (\$636.60 and \$1,194.60 respectively) (Robb & Clapson, 2014). Unfortunately, in 2017, the Government of Saskatchewan eliminated the provincial public transit system, so this option is no longer available (Government of Saskatchewan, 2017c).

The Robb and Clapson (2014) study only calculated the cost of transportation and sustenance but did not include other potential costs to the patient, such as accommodation, if required, childcare, and lost wages. The issue of the financial burden to cover the out-of-pocket expenses for rural dwellers is further perpetuated when looking at mean annual family incomes. The gap in annual family incomes between urban areas and rural areas can be substantial, with rural areas typically earning less than their urban counterparts (Statistics Canada, 2015). The unfunded costs may be prohibitive enough that some rural patients may choose not to seek treatment (Robb & Clapson, 2014).

2.6 Barriers to Care – Social Structures

Inherent to any discussion about access to health care services is the *health* of the individual, so it is essential to understand what factors influence Canadians health and what makes them sick. Social determinates of health (SDoH) must be taken into account when evaluating the geographical impact on access to care as these determinants may mask some of

the disparities (Sibley & Weiner, 2011). It is also relevant to consider what social structures individuals function within and how this can affect their access to care (Pauly et al., 2009)

2.6.1 Social Determinants of Health

The SDoH are a well-established framework that identifies the contributing factors to the wellbeing of individuals, considering the social structures that they function within (Mikkonen & Raphael, 2010). Social determinants of health include income and income distribution, early childhood development, education, housing, food security, employment, access to health care services, social inclusion, culture, Aboriginal status, race, and gender (Mikkonen & Raphael, 2010).

Three main variables function as determinants of access to care and are closely linked to the social determinants of health (Harrington et al., 2013). These variables include *predisposing factors*, such as age, sex, time since immigration, and marital status; *enabling factors*, including education, income, health region (urban, rural, or remote), and having a family doctor; and finally *need factors* based on the number of chronic conditions the individual has (Harrington et al. 2013). It is apparent that the determinants that support better health are the same social structures that promote access to care. Likewise, the reverse is also true, where the determinants that negatively affect health also function as barriers to care.

2.6.2 Systemic Oppression

Unsurprisingly, having a lower socioeconomic status, lower educational attainment, farther distances to travel for care, race, and not having a primary provider all have a negative impact on access to services (Harrington et al., 2013). Despite the constitutional right to universal access to health care for all Canadians, significant barriers exist that impact access to care and disproportionately affect people from lower socioeconomic and racialized backgrounds

(Yang et al., 2015). Oppressive factors, taking the form of racism, sexism, and classism, contribute to inequities in access to care and are the same conditions that influence the inequalities of health (Pauly et al., 2009).

Systemic oppression directly affects equity in access to health care, as well as equity in health outcomes (Pauly et al., 2009). The term “underclassism” describes how the health care system treats patients who experience poverty and racialization, manifesting in marginalization, discrimination, and inequitable treatment (Yang et al., 2015). The intersection of these oppressive factors compounds the challenges that marginalized individuals have by contributing to poorer health status and having disproportionately more barriers to accessing appropriate care. Interventions and initiatives aimed at reducing oppressive barriers are shown to have a positive impact on marginalized individuals, and enhancing equity is compatible with other advancements in social justice (Pauly et al., 2009).

2.6.3 Determinants of Indigenous Health

Given that 85% of northern Saskatchewan inhabitants identify as Indigenous, it would be negligent for me not to specifically address the effect that colonization has had on creating and perpetuating inequities in health status and access to services for Indigenous Canadians. Indeed, while *Aboriginal Status* is considered a determinant of health itself, it is important to understand that Indigenous health is affected by both social determinants as well as complex structural determinants influencing health inequities (Jardine & Lines, 2018).

The determinants of Indigenous health can be considered at proximal, intermediate, and distal levels. *Proximal* determinants are those that have a direct effect on health. In almost every direct SDoH, such as income, education, housing, and food security, Indigenous peoples ranked lower than non-Indigenous people do (Jardine & Lines, 2018).

Intermediate determinants are the factors that directly influence the proximal determinants, such as policies and programs that governments have in place that create disparities in the direct SDoH (Jardine & Lines, 2018). The governments approach to the health care, education, and judicial systems all can have an effect on health outcomes. Governments create policies and determine what programs are prioritized and funded, and what resources are available and where. Deficient policies and programs have resulted in negative effects on health, such as increased rates of disease such as diabetes and hypertension, higher mortality rates, and significantly higher rates of suicide (Jardine & Lines, 2018).

The proximal and intermediate determinants are rooted in the *distal* determinants of health. The distal determinants of health refer to the deeply embedded effect that colonization and systemic racism have had and continue to have on the health and lives of Indigenous people (Jardine & Lines, 2018). It is impossible not to see the devastating intergenerational effects that the Indian Residential School system has had on individuals, families and communities (Truth and Reconciliation Commission of Canada, 2015). Consider life expectancy and infant mortality rates, two indicators recognized internationally to determine population health, there are significant gaps in life expectancies between Indigenous and non-Indigenous populations in Canada (Indigenous Services Canada, 2020). For example, First Nations males and females had a lower life expectancy of 8.9 years and 9.6 years respectively (Indigenous Services Canada, 2020).

2.7 Consequences – Altered Standards of Care

As a direct result of the limited services available in rural areas, patients are more likely to receive altered standards of care, and in turn are at increased risk of having poorer health outcomes. There are many examples of this illustrated in the literature, and indeed already

touched on in this paper. Effective emergency care relies on timely access to diagnostics, specialist care, and definitive treatment and management, all of which are paramount to optimizing health outcomes (Fleet et al., 2013a; Fleet et al., 2018; Koifman et al., 2016). Likewise, delays in accessing these services can result in adverse outcomes.

In pediatrics, care providers are beginning to recognize that initiating early goal-directed therapies is the gold standard approach to manage critically ill children (Holt et al., 2018). Early goal-directed therapy is a targeted approach to diagnosing and aggressively treating sepsis and septic shock to improve mortality by reversing the septicemia in a timely manner (Rusconi et al., 2015). Most children in Saskatchewan do not live within a close enough proximity to access specialized pediatric care in the time frame in which early goal-directed therapy would be most beneficial (Holt et al., 2018). Critically ill pediatrics who are not stabilized prior to transport will often require a medical provider to attend on the transfer, which can result in leaving the community at risk without adequate staffing complement for hours (Hansen et al., 2017).

The evidence is overwhelming that the disparity in access to health services experienced by rural residents leads to overall poorer health status and poorer health outcomes. If we consider stroke care, for instance, mortality rates are higher in patients from rural areas, compared to those residing in larger urban centres (Koifman et al., 2016). The lack of pertinent services required for effective stroke management at the point of care, such as brain imaging and neurology, can be directly attributable to the higher risk of morbidity and mortality (Fleet et al., 2018; Koifman et al., 2016). In a recent study on stroke care and outcomes in Ontario, the researchers found that rural residents were less likely to be transported by ambulance, treated in a stroke centre, receive brain imaging within 24 hours, be seen by neurology, and to access rehabilitative services (Koifman et al., 2016).

That said, there are also some reassuring findings reflected in the Koifman et al. (2016) study; rural residents were just as likely as urban residents to receive interventions that did not require specific resources, such as prescriptions for secondary stroke prevention. This might indicate that providers practicing in rural areas are capable and competent and that a limiting factor to the care they provide is access to specific resources. Another recent study done in Saskatchewan examined the likelihood that a patient living more than 100km from a cancer treatment centre would receive the new gold standard treatment for metastatic colorectal adenocarcinoma. The study revealed access for the more distant patients was comparable to patients living closer to a cancer treatment centre (Payette et al., 2017). This suggests that rural providers are doing an excellent job ensuring their patients are referred to cancer centres and connected to the appropriate services in a timely fashion (Payette et al., 2017).

2.8 Remote Presence Technology

Rural residents can face many barriers to accessing health care services. Recognizing the principles of intersectionality, we can understand that each barrier effectively compounds the disparity of access and can lead to patients receiving altered standards of care, resulting in poorer health outcomes. Innovations and initiatives aimed at improving access to care need to be able to address each of the specific barriers to care.

RPT is one such innovation that is showing promise to improve access to care to residents living in rural and remote communities in Saskatchewan (University of Saskatchewan, 2020). RPT can be beneficial anywhere in the province. However, there is a particular advantage for rural and remote communities (University of Saskatchewan, 2020). This is especially true for Indigenous communities, who experience the greatest disparity of access to care, as well as poorer health outcomes.

Holt et al. (2018) completed a feasibility study exploring the use of RPT in a remote, isolated community in Northern Saskatchewan. Utilizing RPT, a pediatric intensivist based in Saskatoon was able to visually assess, manage, and triage acutely ill pediatric patients, working in collaboration with the local health care team (Holt et al., 2018). The hypothesis was that using RPT to facilitate prompt assessment and intervention by a pediatric intensivist would reduce the need for interfacility transfers and lead to improved health outcomes (Holt et al., 2018). The study demonstrated that RPT was an effective tool to facilitate access to point-of-care expertise. Access to a pediatric intensivist in real-time allowed for early diagnosis and intervention that is consistent with established standards of care.

The pilot project was successful, and clearly demonstrated the ability to optimize pediatric acute care management in rural and remote communities in the north, improve patient outcomes, and reduce the need to transport children out of their home communities, in a safe, cost-efficient way, using RPT (Holt et al., 2018). The overwhelming benefits of this model of care delivery are apparent. The RPT initiative has transitioned from a pilot project into a permanent process and has now become the new standard of care for sites with the technology (University of Saskatchewan, 2020).

There is limited access to specialist services in rural communities. In Saskatchewan, Telehealth has filled some of the voids, but without the use of features, such as the stethoscope and other peripherals, there are limitations to the care that can be provided. Furthermore, both parties must travel to their respective TeleHealth sites, which can be burdensome. The inability to access physician or specialist support in real-time at the point of care in urgent or emergent situations by Telehealth leaves the patient vulnerable.

In critical or emergency situations, it is crucial to have immediate access to specialist support. It could mean the difference between life and death (University of Saskatchewan, 2020). The fact that the specialist can autonomously use the RPT means that the local providers' hands are free to care for the patient with the specialist providing direction and support. In urgent and acute situations, the local providers can consult with a specialist for appropriate management, at the point of care (University of Saskatchewan, 2020). Working collaboratively provider-to-provider also reduces the risk of unnecessary or inappropriate treatments and ensures standards of care are met.

RPT can fill the void and ensure all residents of Saskatchewan can access the care they require when they need it most. In essence, RPT functions to decentralize services by enabling increased access to providers, thus reducing the effect of distance decay and the burden of transportation. It is cost-effective and facilitates more appropriate use of resources. Most importantly, utilization of RPT can lead to improved health outcomes for rural residents in Saskatchewan.

2.9 Conclusion

People living in rural and remote areas experience a disparity to equitable access to health care services, compared to their urban counterparts. Budget constraints and resource limitations have led to the centralization of services and leaving an insufficiency of services available in rural areas. The centralization of services means that more people have to travel greater distances to access necessary health services, perpetuating the effect of the distance decay.

Rural patients have poorer access to primary care, specialist services, allied health professionals, and diagnostic services. The need to transport patients to access necessary services results in a delay in receiving definitive care and management and poorer health outcomes.

When a provider is required to attend a transfer, their absence can leave the community vulnerable.

Medical transportation is not only costly to the health care system, but it can also contribute to the unfunded expenses that patients absorb. The cost that rural patients have to pay out-of-pocket is exponentially higher than patients living in urban centres. This can result in patients delaying or choosing not to seek treatment at all.

Social determinants of health remain a significant barrier to a person's health and ability to access appropriate services. Geographical barriers to care compound the oppressive barriers to care, reflected in the social determinants of health. The intersection of barriers decreases both equity in access and utilization rates.

RPT is a cost-effective innovation that can increase equitable access to many services that are not otherwise available in rural communities. This model of care can help decentralize health care by taking the services to the patient, rather than the patient to the services. This model of care can also reduce the effect of distance decay. By providing services remotely, more patients can remain in their community with their family and support systems, and reduce the financial burden of covering the unfunded costs. Finally, the use of RPT can result in the more judicious use of scarce resources, which can have far-reaching benefits to the overall sustainability of the health care system.

CHAPTER III: METHODOLOGY

3.1 Prologue

I selected Autoethnography as my methodology in large part because I was frustrated that I did not see my experience as a NP in a remote setting using RPT reflected in the literature in a meaningful way. The decision to select this methodology was guided by my research questions I was the first nurse to use and champion RPT in clinical practice in Saskatchewan and I have a unique and intimate knowledge of the reality of this model of care. Autoethnography lends itself well to a critical reflection that can explore the knowledge and implications that this initiative can have on NPs' practice. As I was unfamiliar with autoethnography as a methodology, I spent a lot of energy to develop a process that I could use to frame my research and enhance the credibility.

3.2 Autoethnography

Autoethnography is a method of qualitative inquiry that uses the researcher's experiences to understand broader sociocultural meanings. Rooted in the triad of '*auto*' (self), '*ethno*' (culture), and '*graphy*' (study), autoethnography seeks to attain cultural understanding through the study of self (Chang, 2008). Chang (2008) suggests that the process of autoethnography should be "ethnographic in this methodological orientation, cultural in its interpretive orientation, and autobiographical in its content orientation" (Chang, 2008, p. 48). The primary data comes from the autoethnographer's personal experiences, and then analyzed and interpreted to find cultural understanding.

There are two main genres of autoethnography: evocative and analytic. Scholars have not reached a consensus on these approaches to autoethnography. Indeed, the debate can be quite polarized between those that promote evocative research and those in the analytic camp, as evidenced by the dedicated issue in the Journal of Contemporary Ethnography to examine analytic autoethnography from the perspectives of both sides (Anderson, 2006b). Ultimately, it comes down to different epistemological and theoretical perspectives, as well as the intended outcome of the research.

3.2.1 Evocative Autoethnography

The most common and traditional approach to this method is evocative autoethnography (Ellis et al., 2011). Many of the most influential contemporary researchers have developed and championed evocative autoethnography, including Ellis, Adams, and Bochner (Anderson, 2006b). In evocative autoethnography, the process is also the outcome, and it is not intended to challenge or define theories, but rather to describe a social phenomenon (Ellis et al., 2011). Evocative autoethnography does not seek to generalize beyond an individual case and value is

placed on emotional depth, and thickly detailed, concrete “stories”. The research is intentionally subjective, actively incorporates emotionality, and encourages researchers to be “self-consciously value-centered rather than pretending to be value free” (Ellis et al., 2011, p. 274).

Evocative or emotional autoethnography is based mainly in the realms of postmodernism and poststructuralism (Ellis et al., 2011). It is very concerned about power structures and imbalances of external researchers and is deeply critical of epistemology and hierarchy of research. Ellis and her colleagues understand that researchers can and perhaps should move away from the traditional structures used to represent others within the Social Sciences, and instead that research can be a “socially-just and socially-conscious act” (Ellis et al., 2011). Evocative autoethnographer scholars reject establishing set criteria and having a systematic approach to this research (Ellis & Bochner, 2006). Evocative autoethnography encourages creativity and seeks to invoke an emotional reaction in the audience. The researcher can present the work in multiple forms, from written dialogue, prose, to theatrical performance. Denzin (2006), another prominent evocative autoethnographer, has described it as “messy vulnerable texts that make you cry” (p. 421).

3.2.2 Analytic Autoethnography

Analytical autoethnography is a subgenre of critical analytical ethnography, championed by prominent researchers including Anderson, Chang, Atkinson and Charmaz (Anderson, 2006b). Like evocative autoethnography, analytical autoethnographers recognize that there are multiple ways of knowing, however they believe that there is also a place for critical analysis and have the goal to develop new theories (Anderson, 2006a). In contrast to evocative autoethnography, analytical autoethnography is founded in realism and seeks not only to *describe* but also to *explain* a social phenomenon (Anderson, 2006a).

Analytic autoethnography is inductively orientated, strives for objectivity, and encourages researchers to practice heightened reflexivity (Chang, 2008). The goal is to develop theoretical understandings of broader social phenomena through a process of continuous refinement, elaboration, and revision (Anderson, 2006a). Analytic autoethnographers are more open to aligning with traditional qualitative inquiry and promotes having a transparent process and establishing standards.

Analytical autoethnography resonates with my own epistemological and theoretical perspectives, as well as what I hope to achieve with this research, which is influencing policy change. For example, I refute the positivism philosophy of dualism in knowledge and believe that there are multiple ways of knowing. I challenge the traditional hierarchy of knowledge; however, I find it insufficient simply to describe the phenomenon that I have been a part of when I want to influence changes to policies. I do not believe that either analytical or evocative methods are superior, per se; however, I do think that it is essential to choose the approach that is appropriate to the goal of the research. In my case, I want to leverage and critically analyze the knowledge and experience that I have gained as an NP using RPT contribute to the literature. Analytical autoethnography is the appropriate approach that will enable me to do this.

3.3 Limitations

There are many limitations of autoethnography as a qualitative inquiry. The lack of established research procedures and transparent processes, the overt subjectivity, and emphasis on narrative over analysis have led some scholars to challenge the credibility of autoethnography as a legitimate research methodology (Chang, 2016). The subjectivity and autobiographical nature of the methodology can limit the application of the research to a broader social context.

In many ways, autoethnography is counter to more traditional, empirical research. Even within social scientific standards, autoethnography can be dismissed for being “insufficiently rigorous, theoretical, and analytical, and too aesthetic, emotional, and therapeutic” (Ellis et al., 2011, p. 283). Therefore, it is imperative to demonstrate rigour and the analytic process when using this method.

3.4 Elements of Analytic Autoethnography

As there is not an established process to ‘do’ analytical autoethnography, I have sought out multiple sources to guide my approach to this research. Anderson (2006a) has been a prominent scholar advocating for analytic autoethnography and has been influential in clarifying and defining the methodology. Anderson (2006a) has proposed five key features of analytic autoethnography, including (1) the researcher being a member of the culture or holding complete member researcher status, (2) practicing analytic reflexivity, (3) being visible in the narrative, (4) having dialogue with informants beyond the self, and (5) being commitment to theoretical analysis (p. 378).

3.4.1 Complete Member Researcher Status

The first feature Anderson (2006a) identifies is a distinct component to any autoethnography; the researcher must be a complete member of the culture that is under study. If the researcher was not a complete member of this culture, then the research would be an ethnography. Acquiring the necessary intimate familiarity with the social world can only occur when the autoethnographer is a member and participant. Of course, even within homogenous groups, members can have highly variable sets of values and beliefs, and often have very different experiences and interpretations of events (Anderson, 2006a). As a member of the culture, the researcher holds one set of values and beliefs, and while it may be different for other

members of the same culture, the researcher's understanding can evolve through engaged dialogue with the others (Anderson, 2006a).

For my research, I examined the impact that the use of RPT had on the practice of NPs working in a remote community. I have complete member researcher status because I am an NP who lived and worked in a remote community in northern Saskatchewan and used RPT. I worked with several other NPs in this First Nations community. Notably, none were from the community, nor identify as Indigenous, so we had our own 'outsider' community.

3.4.2 Analytic Reflexivity

Reflexivity refers to the self-awareness of the reciprocal cause and effect relationship between an individual and their environment (D'Cruz et al., 2007). A high degree of reflexivity refers to an individual having a large effect on their environment, whereas, having a low degree of reflexivity means that the environment has a large effect on the individual (D'Cruz et al., 2007).

Analytic reflexivity refers to the researchers' consciousness of their own connection to the situation, and thus the effects they have on it (Anderson, 2006a). In autoethnography, researchers need to be aware of their position within the social setting, and how their own actions can influence the environment (Anderson, 2006a). This is not to say that autoethnographers should try not to influence the environment, but rather they need to recognize this effect, and reflect the effect in the text. Indeed, there is the potential that the process of doing an autoethnography could result in an unanticipated effect as researchers' beliefs and actions may be transformed because of their reflexive analysis (Anderson, 2006a).

Throughout the two-part autoethnography that I wrote, I center myself as being a novice NP and reflect on how that position influences my experience and perspective of using RPT. My

use of RPT influenced how I evolved as a clinician and the application of RPT changed as I grew more confident and competent in my practice.

3.4.3 Narrative Visibility of the Researcher's Self

In ethnography, typically the researcher is hidden behind the text; invisible yet omnipresent (Anderson, 2006a). Autoethnography differs from this, as the researcher is much more than a detached observer. Since the autoethnographer maintains the dual role of being an actor engaged in the social world being observed and as a researcher of the same social world, the researcher's self needs to be visible within the resulting text (Anderson, 2006a). To better understand the social world being studied, it is vital to incorporate the autoethnographer's own feelings and experiences into the text (Anderson, 2006a).

In my autoethnography, the narrative is drawn from my personal experiences. It is impossible to separate myself from the phenomenon. I incorporate a lot of critical reflection into the writing, from describing the situations, to analyzing, and interpreting the meaning.

3.4.4 Dialogue with Informants Beyond the Self

There is a risk in autoethnography to become insular and self-absorbed, however as the goal of the research is to gain a deeper understanding of complex social worlds, it is imperative to reach beyond the self (Anderson, 2006a). The researcher's subjective experience is the foundation of autoethnography, yet it is important not to lose sight of the other. The interrelationships between the researcher and others can lead to greater insights and understanding and can inform and change social knowledge (Anderson, 2006a).

I exercised restraint from speaking for 'others' when writing my autoethnography, however actively incorporate my subjective and objective impression of their perspectives. The 'others' in this case include patients, my colleagues, the management team, and the specialists. I

recalled conversations I had with the various stakeholders and endeavored to accurately reflect their impressions.

3.4.5 Commitment to Theoretical Analysis

The final component that Anderson (2006a) describes is a commitment to theoretical analysis. The intention of analytic autoethnography is to go beyond *describing* a phenomenon to *explaining* the phenomenon. Anderson (2006a) posits that “the defining characteristic of analytic social science is to use empirical data to gain insight into some broader set of social phenomena than those provided by the data themselves” (p. 387). Indeed, at the crux of analytic autoethnography is this goal to transcend beyond the data and seek to advance a theoretical understanding of the phenomena through broader generalization (Anderson, 2006a).

Commitment to theoretical analysis is one of the defining features that drew me to analytic autoethnography. Beyond just wanting to have my experience reflected in the literature, I wanted to better understand what the significance of using RPT in the remote setting was for patient care and for my practice as a NP. The process of doing the theoretical analysis allowed me to provide some specific recommendations that can influence policy decisions.

3.5 Quality of Autoethnography

To enhance the quality of autoethnography in health research, Chang (2016) proposes five standards in which to judge the quality of the research including (1) authentic and trustworthy data; (2) accountable research process; (3) ethics towards others and self; (4) sociocultural analysis and interpretation; and (5) scholarly contribution. Using these standards as a foundation to autoethnography will help demonstrate the rigour and analytic process of the research.

In many ways, Chang's proposed standards compliment Anderson's key features of analytic autoethnography. For example, Anderson (2006a) endorses the need for the researcher to have complete member status and engaging in dialogue with other social members. This connects with Chang's (2016) standards promoting the need to have authentic and trustworthy data and ensuring maintenance of ethical standards. Analytic reflexivity can lead to sociocultural analysis and interpretation. Anderson (2006a) emphasizes that researcher's need to be committed to advancing theoretical understanding of a social phenomenon, which has a natural connection to the goal of scholarly contribution as Chang (2016) encourages.

3.5.1 Authentic and Trustworthy Data

Ensuring authentic and trustworthy data is fundamental for all research, regardless of methodology; however, this can pose a particular challenge in autoethnography. Often the primary data source in autoethnography centres on personal memory; however, time can shape and distort memory, and thus may not be completely reliable (Chang, 2016). Using multiple sources for data collection to corroborate and triangulate the data enhances the trustworthiness.

I used several different sources of data to supplement my recollection and ensure the trustworthiness and authenticity of my research. I am fortunate that all the encounters from the original feasibility study were video recorded, and I had the opportunity to view these recordings. The recordings were from the vantage point of the specialist through the robot. This enabled me to re-live the experience of the encounter but from the perspective of the specialist. I was able to watch myself in the situation, follow the dialogue, and see elements of the encounter that I was not aware of in the moment. This meant that I was not relying solely on my memory, as I had the videos as concrete data from which to observe and reflect on the reality of the

encounter. I also collected documents and artifacts, such as email correspondence and minutes from meetings held during that time, to corroborate the events and my perspectives at the time.

3.5.2 Accountable Research Process

As there is not a prescribed process to do autoethnography, the need to clearly establish and demonstrate the research process is essential. There were four phases in my iterative research process. Using some adapted writing exercises suggested by Chang (2016) as a framework, I started by doing an initial reflection of my experiences and perspectives. I looked through the notes I had made at the time and went through relevant correspondence. The purpose of doing the writing exercises is part of the data collection process. This writing process itself can take different forms, such as making jot notes or a list or writing longer prose on an experience. It is a tool for the researcher to help to organize the data, and can be useful to trigger memories, focus thoughts, and start to identify themes.

I did several writing exercises, such as writing out an annotated chronological history of my career, listing the different providers and disciplines that I worked with remotely, comparing NP practice in a remote versus urban environments, and reflections on specific challenging situations I faced practicing in the north. Some of the writing exercises were simply writing out a list to help trigger memories and organize timelines. Other writing exercises were more narrative and helped me to explore the experiences I had in more depth.

The second phase involved reviewing the video recordings of the encounters. I looked for elements that occurred during the encounter that may not have been possible without using the RPT. I was able to watch my own practice and relive the encounters from the vantage point of the specialist. This also provided the opportunity to see the whole picture objectively without

having to rely on memory alone. I created a spreadsheet that made notes from the video audit of each encounter.

The third phase was to analyze the data and write a preliminary draft of a paper. It is an iterative process that began during the first phase, and then further developed and refined in the second phase. I printed the spreadsheet and cut out each square, organizing the statements into categories and themes (see Figures 3.1 and 3.2). The findings from the second phase triggered the need to return to the first phase and do more writing exercises. Likewise, the analysis and writing process provided new insights and perspectives, necessitating revisiting the previous phases. It was at this point that I spent more time working on reflections about specific events that ultimately opened each chapter.

Figure 3.1 Notes from Video Audits, Unorganized

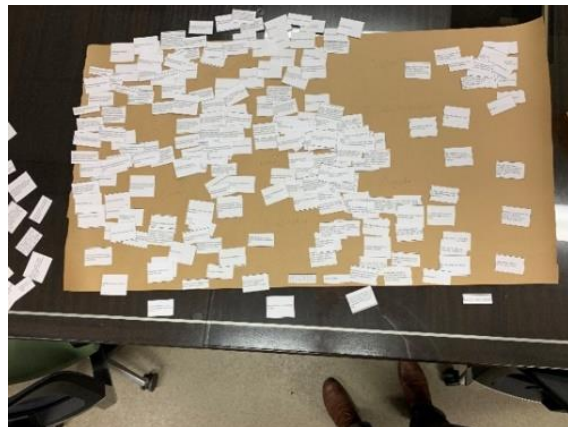
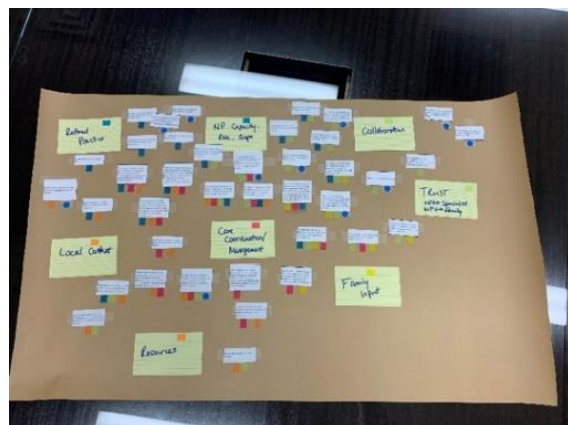


Figure 3.2 Notes from Video Audits, Organized into Categories



The fourth phase involved reaching out to my former colleagues. I shared with them my findings and interpretations that I had made, seeking to validate it if they agreed, allowing room to discuss any disagreements, and learning about their perspectives. Initially we had some in-person discussions. After I had completed the drafts, I asked them to read it and provide feedback. I did a final reflection to compare and reconcile what my initial self-reflection was with the objective video reviews and the viewpoints that my colleagues shared with me.

3.5.3 Ethics Towards Self and Others

While the primary source of data in autoethnography is the researcher, the reality is that the research can implicate others in the work. Such is the case with my own research. As my research was derived from the study done by Dr. Holt et al. (2018), I submitted an amendment to the original application to the Research Ethics Board and got approval for this study. I needed to demonstrate that I consciously and thoughtfully considered the impact this research could have on other individuals, and how I mitigated risk and maintained high ethical standards in this research. This amendment also included a request for secondary use of data from the original research, including the video recordings of the encounters and other data compiled during the study.

There are some key stakeholders who were involved in the original study. The first group included my former colleagues, the other NPs who worked in the community with me. Ultimately, this is the culture I studied. I anonymized these individuals as much as possible. I felt that it was imperative to give them an opportunity to voice their perspective, particularly if it were dissenting, so they could have the option to add a response to the final manuscript if they wished to do so. Two of my former colleagues agreed to review the manuscript, and the feedback they gave me was that they agreed with what I had written.

The next two groups of key stakeholders include the patients as well as the specialists who I collaborated with using the robot. As with my former colleagues, I paid a great deal of respect to the patients and the specialists, and I anonymized individuals as much as possible. It was easier to anonymize the patients; however, as there were very few specialists that we worked with using the RPT, they could be more easily identified. The primary specialist involved suggested I conduct this research and supported me to get the ethical approval from the Research Ethics Board and has reviewed the manuscript for feedback and approval.

3.5.4 Sociocultural Analysis and Interpretation

An autoethnography is the study of self and the social world within which the researcher exists. The nature of this methodology requires the researcher to draw from their personal experiences and connect this to the sociocultural context of those experiences (Chang, 2016). Autoethnographers need to reflexively analyze what the significance of their experience is within the social world, and what meaning the social world puts on their personal experience (Chang, 2016). The researcher must consider what their experiences means in relation to others' experiences, and how others reacted to these experiences. Through this analysis and interpretation process, the researcher can begin to develop a theoretical concept generalized to a broader group. I used external guideposts from the literature to help provide some structure with which I could develop my own concepts.

3.5.5 Scholarly Contribution

Since the purpose of analytic autoethnography is to understand the sociocultural meanings of human experiences, it is essential for the research to be both relevant and transferrable to others (Chang, 2016). The results from an analytic autoethnography can provide novel insights and deeper understandings about social phenomena that is not readily achievable

using other methodologies and can benefit the broader research community. My goal with this work is to produce a publishable paper of my findings, thus introducing into the literature the effect that using RPT can have on NPs.

3.6 Conclusion

Analytic autoethnography is a relatively new research methodology grounded in social science inquiry (Chang, 2016). Analytic and evocative autoethnographies have fundamental differences in the intent, process, outcome, and final product of the research. The goal is to gain an understanding of a societal culture and the meaning through personal experiences.

Maintaining a transparent, systematic approach, having a commitment to critically reflexive analysis and interpretation and adhering to the quality standards can result in credible and defensible research.

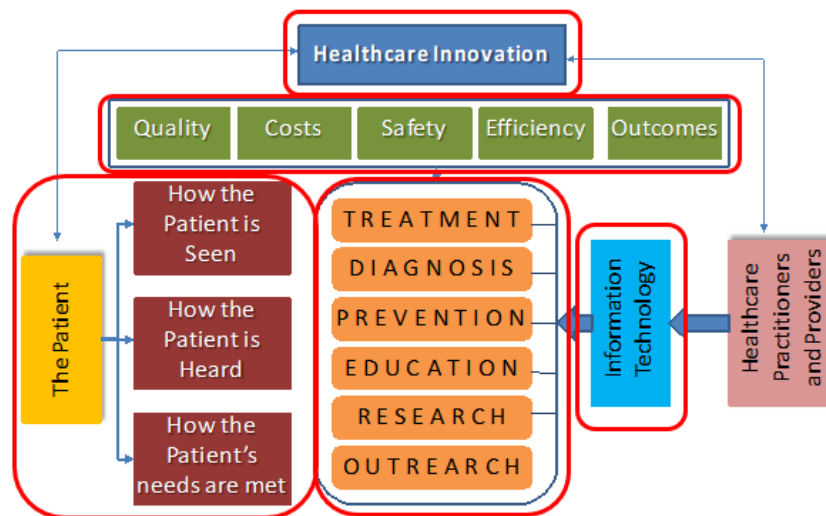
CHAPTER IV: AUTOETHNOGRAPHY PART I

4.1 Prologue

This chapter is Part I of my autoethnography addressing the first two parts of my second research question: What elements can occur during RPT interactions that would not have been possible in the traditional model of care? And What elements contribute either to successful encounters, or serve to hinder the success of the encounter?

In this writing, I am relating to the conceptual framework, primarily focused on the patient and how they are seen, how they are heard, and how their needs are met. I also consider the effect on quality, costs, safety, efficiency, and outcomes from using the health care innovation (see figure 4.1).

Figure 4.1 Conceptual Framework, Areas Addressed in Chapter IV



On a personal note, I admit, when I decided to write an autoethnography for my thesis, I was not prepared for how vulnerable it would make me. The next two chapters are deeply personal, far more intimate than I ever imagined I would share in a scholarly platform, let alone with most other people. It is well beyond my comfort zone. However, as exposing as it is, I feel

that in this vulnerable state is where I have been able to really made sense of the phenomenon that I experienced. *This* is what is missing in the literature on RPT and other telehealth or virtual care platforms. True, lived experience. My true, lived experience. The process of writing this was cathartic in a way. I experienced a wave of emotions, perhaps feeling them more acutely with hindsight and distance. Remembering some of the situations I was in, my heart still races, and I can feel the anxiety, the stress, the excitement, or the relief. It is somewhat terrifying, or in the least uncomfortable, to put it out to the world and open myself up and share it with others. With you. I hope that you will receive this with an open mind, and a generous spirit.

4.2 An Autoethnography of a Nurse Practitioner Using Remote Presence Technology in an Isolated Community: Part I

Towards the end of my NP Program, I made the unexpected decision to move from Toronto to Saskatchewan to work in an outpost clinic. La Ronge, it turned out, was not an outpost. While La Ronge is geographically quite north and relatively isolated, it boasts a large physician group and a functioning hospital. It is a rural community, rather than a remote setting. Within an hour of starting my new job, I realized I had made a huge mistake, but I decided to stay on while I completed my program and give it a chance. As I was not yet an NP, I obtained my Transfer of Medical Function (TMF) so I could practice in an advanced RN role.

After being in La Ronge for three or four weeks, I took a pre-negotiated leave of absence to do the first of my final three practicums in a nursing station on a reserve in the North. I was excited to go! I had very minimal exposure to reserves at that point and was not sure what to expect. I loaded up my Subaru, and with my dog, Cheemo, I made the drive to the community.

I arrived mid-morning on a Tuesday, settled the dog into one of the nursing units, and went over to the clinic to meet my NP preceptor and the rest of the team. It was already a busy day, and they were short-staffed, as they perpetually were. My preceptor was manning the pharmacy and asked me if I could grab a chart and start seeing people, and I could check in with her as needed. So, I did! Talk about Baptism by Fire! I was in my element! *This is what I moved to Saskatchewan to do!*

My preceptor was a dynamite woman in her mid-sixties. She has spent her entire career in the North. While she is not Indigenous herself, she is married to a Cree man, has treaty status, and lives fully integrated within the community. She is among the first cohort of NPs in Saskatchewan, having been grandfathered into the class, a system that no longer exists. What she

lacked in formal education, she made up for with decades of experience and an intimate knowledge of the community. In many ways, we were a good pairing. As an independent learner and entrenched in academia, I was able to bring forward best practice guidelines and updated standards of care. She was able to guide me to better understand the strengths of the community, the barriers and issues they faced, and more of the nuances of working in a First Nations outpost clinic on a reserve. She was a fierce advocate for the people and the community we were serving. What I learned from my preceptor could never be taught by reading a textbook, journal article, or in a class discussion.

I still have the clinical logs that I had to complete during this practicum and reading through them really put into perspective the variety of things we see as NPs in the community. Due to the perpetual nursing shortage, there were almost no programs functioning, such as a chronic disease program, so everyone was seen as a walk-in patient on a first-come-first-serve basis. Several patients were seen for regular episodic care, such as coughs and colds, ear infections, rashes, sexually transmitted infections screening and treatments, and general aches and pains. We also saw patients for chronic care, such as diabetes, hypertension, medication refills, and prenatal care. Dispersed within these cases, we also managed any emergencies that came in, frequently assaults and other traumas, as well as cardiac issues, alcohol withdrawal, abdominal pain, or seizures. I would see a kid with an ear infection, then suture up a stab wound, then do a prenatal visit. It sounds fairly straight forward, but in reality, very few cases were anything like the textbook cases we had studied. Very few patients being managed for diabetes were even remotely well controlled. Many had not had any relevant blood work done for years. Medications were being refilled without adjustments, or even being seen. In fact, a lot of the conditions being seen for episodic care were actually a result of their under-managed chronic

conditions, such as persistent yeast infections and poorly healing wounds and ulcers. The paper charts were cumbersome, and frequently documents were misfiled, making it very easy to miss important information.

I want to be clear that I am not criticizing or blaming the nurses who were working there. Quite frankly, they were functioning essentially in survival mode much of the time. The workload is unbelievable. The population of the community was easily quadruple that of many other communities with nursing stations, and, in my opinion, the population served was certainly large enough to justify a small hospital. Indeed, most communities this size (or even smaller) in the northwestern part of the province have their own hospitals, despite having closer access to other hospitals (Meadow Lake, North Battleford, La Loche, Ile a la Crosse, Lloydminster). In contrast, there are no hospitals east of La Ronge.

4.2.1 On-Call Chaos

In short order, I was hired on as a casual nurse to help with on-call coverage for after hours when the clinic was closed. After shadowing my preceptor and the other nurses during their on-call shifts that week, I was 'on' by the weekend. They were so desperate for coverage that it was only me and another RN who came to help from another northern community to fill in. Typically, there are three nurses on call on the weekends, but this weekend it was only the two of us. He had never been to this community before, and I had been there for four days.

We were working around the clock, alternating first and second call in 12-hour shifts, but both of us ended up being there together much of the time trying to manage the demand. The RCMP brought in three people together. They had been in a massive fight – with each other – and the weapons of choice were baseball bats and hockey sticks with razor blades added to the

inner curve. One patient sustained such a large avulsion wound to his head that it is essentially a partial scalping.

Another patient came in to refill her chronic meds. She did not come in during the days because she did not want to wait, so intentionally waited until the clinic was closed, and then came to the emergency room. Someone else came in with symptoms of an upper respiratory tract infection (URTI) they had for 4 or 5 days. They also waited until after hours to come in because they would be seen faster. These kinds of cases presented to the emergency room repeatedly and frequently during on-call hours, and honestly, it was infuriating. The on-call nurse is supposed to be there for emergencies only, and it really did feel like community members were exploiting us. I believe that this was merely a symptom of the failing system. The clinic was only open for patients between 0900-1700 minus an hour for lunch. The problem is, these are not the hours that many people in the community function in, and those definitely are not the hours that would realistically meet the needs of the community. Compound these challenges with a severe shortage of nurses resulted in limited access to quality and appropriate care.

4.2.2 Blueberry Blue

That weekend we were running on fumes. Taking quick naps when we could, but otherwise running at full speed. Then, a case presented that I will never forget. The ambulance arrived and rushed into the emergency room with a patient, with the family following in a panic. Apparently their 14-month-old had stopped breathing and turned blue for a few minutes. Looking at the child, he did not look toxic. He was babbling and interacting appropriately during the exam, grabbing at the stethoscope and my hair. He was very alert, had good colour, fleshy mucous membranes, good capillary refills, lungs sounded great, good oxygen saturation, and was moving around vigorously. Neither my partner nor I were sure what to make of it. Maybe he had

been choking on something and was able to clear it? There were no wheezes or indrawing on inspiration, potentially indicating an obstruction of some work. I was looking a seeming well babe.

Suddenly, he turned blue. Like blueberry blue. A blue I have never seen a person turn before. He was having a completely apneic episode, and it was terrifying. He was conscious, but barely. His oxygen saturations tanked into the 70's and he was hypoxic. He did not respond to stimuli; he did not respond to supplemental oxygen. We started compressions and back thrusts in case he had something lodged in his airway. No effect. And then, spontaneously, he was fine again. Normal colour, good saturations, good lung sounds, no wheezes or transmitted sounds. Heart rate and respiratory rate normal. He was vigorous. There was nothing that we could visualize in his airway. Honestly, I cannot tell you if it lasted 2 minutes or 10 minutes. It felt like an eternity. If we had a full team who knew what was going on, we would have had a recorder noting the timing of every intervention, but we were more consumed with trying to save his life than looking at our watches. We were still recovering from this incident when it happened again. I do not think it lasted as long, but he went just as blue—an impossible shade of blue.

I called the doctor in the emergency department (ED) in Prince Albert. The protocol was to fax a form to the ED in Prince Albert, and the ED nurse would triage it and place it somewhere in the stack of charts of patients waiting to see the doctor. They would often respond by fax with instructions. If they recommended sending the patient to hospital, they would have to go to Flin Flon, Manitoba, as that was the closest hospital. Even though it was out of province. Even if they were not the appropriate level of care for the patient. No, they would not call the Flin Flon doctor with the referral, so the patient would show up, and the Flin Flon team were not particularly happy to see our patients. It was a ridiculous protocol. It was not a safe protocol. So,

I broke the protocol and called the doctor directly. He sounded mildly irritated, but I think he could sense the urgency in my voice. I was describing the case, as reported initially by parents then witnessed by myself, and he asked what the patient's current status was. The child was seemingly fine. Vital signs stable. Sitting, playing with toys. Relaxed. He looked healthy. He looked fine. The doctor was in the midst of telling me the same thing that I had been telling the parents initially when the child had another episode. I could not be on the phone and have my hands on the patient, so I passed the phone to the security and rushed to the patient. The security put the physician on speakerphone, and he was asking a lot of questions, but not giving any advice. He could not see what was happening, and we were not in the position of being able to articulate the whole picture adequately while simultaneously trying to figure it out ourselves. After that episode resolved, again just as spontaneously as it began, the doctor finally said to "just send him to Flin Flon." Flin Flon? Admittedly I was new to Saskatchewan, and the community, and northern nursing, and everything, but I already had enough experience with Flin Flon to tell me that it was not an appropriate option. But what could I do?

The practice in the clinic for cases like these was 'load and go.' Get the child to a hospital, any hospital, as soon as possible. The ambulance is staffed with one primary care paramedic (PCP) and a driver, so for any critical cases, a nurse must go on the trip. I had already gone on three trips in the back of the ambulance that weekend. But this time it was different. The apneic episodes occurred more frequently, and I was essentially alone to manage the child. Even writing about this event more than six years later, I can still vividly recall the fear and desperation I had during that long drive. Flin Flon is about 120 km away, with more than 50 km being a grid (gravel) road. I had an unstable babe, and I alone was responsible for his life. I honestly was not sure if he would make it, and I definitely was not equipped to manage his care on my own. By

some miracle he survived the trip, and the Flin Flon doctor had enough sense to send him to Saskatoon. He should have gone to Saskatoon in the first place. I knew that all along, but I did not feel empowered to go against the Prince Albert doctor and the strict protocols we had at the clinic and from the First Nations and Inuit Health Branch (FNIHB).

This is one of the worst moments I have experienced in my entire career. He deserved better, and while in one sense I had failed him, I knew that the whole system was the issue. I also knew that this was something that I could really make different as an NP. I was wholeheartedly invested in trying to improve access to care for this community.

To this day, I do not know what exactly happened. Over the years, I got to know the parents, and saw the child frequently, but we never received a discharge note from the hospital, and the parents were not able to explain the diagnosis.

4.2.3 New Beginnings

Fast forward to the fall of that year. I had just completed my NP program, written the national exam (CNPE), and finally resigned from my position in La Ronge to live and work full-time on the reserve. The month before I arrived, two additional NPs from the east coast had been hired. They were strong NPs, with collectively about 20 years of experience. Between them, they had a background in the emergency department, mental health and addictions, well women, and chronic care. As a brand-new Grad NP, having the support and mentorship from them was invaluable. Having their friendship proved to be a lifeline.

The addition of the three of us eased some of the burdens of the severe staff shortage. It meant that there was more stability and continuity to the team, rather than relying on a revolving door of casual nurses. Do not get me wrong, we were still definitely short-staffed, but we were not working in crisis mode, and I noticed the difference right away. I also began to see the

standards of care begin to evolve and improve. More time was dedicated to programming, and the chronic care program transitioned to focus more on active management. Existing practices were challenged and updated to reflect the best evidence. Boundaries were established for on-call hours, and while it did affect access to care for the community in one sense, it was absolutely necessary for the preservation of the nurses. The existing system was simply not sustainable.

Our daily morning nursing meeting helped us understand a lot of the dynamics in the community. Most of the RN's were Indigenous, and for the most part, they were either from the community themselves or had family there. We got to know our patients and the family structures. We became familiar with the issues people faced. We were exposed to the customs, learned about the values and beliefs, and how the community functioned. We began to understand more about the real struggles they faced, such as the deplorable living conditions many people had and poor access to groceries after the one grocery store burnt down. Alcohol abuse was a rampant and destructive force there, but I believe it is more of a symptom of poverty and a response to the trauma the community had experienced. We saw the resiliency of the people who have survived often unimaginable situations, including the legacies of Residential Schools, colonialism, institutionalization, and the resulting intergenerational trauma.

4.3 Rosie the Robot

Sometime between my first and second clinical rotation as a student NP in the community, a robot appeared. It was a RPT device, roughly the size of an adult, with a large screen on top for the face. Researchers selected this community to pilot this technology because of the isolation, the size of the population, and the acuity of our patients. We were told that a specialist could connect and assess patients and manage care remotely. It had a built-in

stethoscope, and other peripheral devices could attach, enabling the specialist to perform advanced assessments.

I immediately knew this technology would be a game-changer and had the potential to really save lives and help us. The only problem was, we did not have anyone on the other side. So it sat, untouched for about eight or nine months. The initial interest and buy-in dissipated, and it became yet another thing that did not work and was in the way.

All that changed one day in November. It was during my first or second week working there, and we were asked to bring the robot into the room for our morning nurses meeting. There was a doctor who was interested in using the robot. That morning we met Dr. Tanya Holt, a pediatric intensivist, and the medical director for the specialized interprovincial pediatric transportation team. She saw the potential of using RPT to help triage children being considered for interfacility transfers.

Dr. Holt exuded warmth and was clearly enthusiastic about working with us using the robot. She committed to being available virtually 24/7 and gave us her personal cell phone number to call anytime. I had a flashback to the child with the apneic episodes I had seen a few months earlier and thought how profoundly different it would have been if we had access to pediatric support using RPT then.

4.3.1 Taking the Leap

A few weeks passed, and Dr. Holt still had not received any calls. She kept checking in to ask why we were not using the robot. We actually had not had a case that warranted using it. Then one evening, I was on-call, and a mom brought in her sick toddler. It started with some coryza, but now she had a high fever over 39 degrees, and she was quite lethargic. She refused to take anything by mouth and was at risk of becoming dehydrated. Her lungs were clear, and her

breathing was normal. Her heart rate was elevated, likely secondary to the fever. Her O2 saturation levels were good. She was obviously in discomfort and was very resistant to my attempts at doing a more in-depth assessment. It presented viral-‘esque’, but she was much sicker than I expect for a viral infection, but I couldn't identify a bacterial infection either. I did not think she necessarily needed to be transferred to hospital, but I was not sure what to do. I could call in my second for another opinion, but I did not think they would be able to do more than I was already doing. That uncertainty can be crippling. I was a novice NP, and the jump from NP student to full NP was profound, and I was overwhelmed with the feeling of professional isolation.

I decided to call Dr. Holt. I remember feeling a bit hesitant to call her. It was pretty late; I did not want to bother her. Is this an appropriate thing to call her about? Would she judge me for not being able to handle this on my own? There is a certain vulnerability to calling and asking for help. At the same time, this child was sick, and I was not sure what to do. Plus, I was really curious about how the robot would work and eager to try it out. I asked the mom if it was ok, and she agreed although seemed a bit hesitant, or perhaps it was skepticism. She just wanted her daughter to feel better.

So, I called Dr. Holt, and she answered with genuine excitement. *Of course* she would help me! I went to get the robot, and within a couple of minutes, Dr. Holt appeared on the screen. She immediately made me feel at ease, and I could see the mom's ambivalence fade away. I gave the history and the assessment I had done thus far and relayed what my concerns were and what I was uncertain about. I had given the child an acetaminophen suppository earlier, which began to take effect and brought the fever down. Dr. Holt suggested I also give her some ibuprofen to help with the pain. We were able to perform an assessment together, each of us figuring out how to

work together using the robot. It was not difficult, but we did have to be much more intentional and mindful – where should the robot be positioned? Where should I stand? What do we need to communicate to each other? What does she need me to do for her to be able to do an adequate examination? It was a little bit of a song and dance, but it was not unnatural. To be honest, when providing care to a patient with another provider in person, you also have to communicate.

In the end, we diagnosed the child with Coxsackie Disease, a viral infection also known as Hand, Foot and Mouth disease. I mistook a rash on her cheeks to be eczematous, and I had not been able to look in her mouth to see the classic blisters. She did not have any sores on her palms or soles of her feet. And she presented a lot more unwell than I had previously seen with the condition.

Throughout the entire encounter, Dr. Holt empowered me. I did not feel any judgement from her. She was able to communicate with the mom and directly addressed her concerns. She also openly validated my own capability and helped increase the trust the mom had in me. In the end, I think all of us left the encounter better off.

This particular case was not a life-or-death situation but having the support when I needed it was powerful. Without RPT, I may have ended up putting her on yet another course of antibiotics. Even though I thought it was likely viral, given how sick she presented and how high her fever was, I just was not sure, and antibiotics would cover my bases. I was not planning to send her to hospital, but I am certain I would have gone home and worried about her all night. That is the thing about professional isolation; the onus of the clinical decision-making is on your shoulders.

In hindsight, this was probably the perfect case to be our inaugural RPT encounter. The child was sick enough to warrant a consultation but was also in a stable condition allowing us to

take our time and figure out how to use the technology. We were able to use the stethoscope, but most of the assessment was based on visualizing the patient.

The next day in our morning meeting, I excitedly told my nursing colleagues about my experience using the robot the evening before. They were interested in how well it worked. Some of the nurses asked about the functionality of the robot and the ease of using it. Someone asked how Dr. Holt was – while it may not have been stated explicitly, every nurse has experienced trying to consult a physician who was grisly, and it was clear that they were asking about her attitude and responsiveness.

4.3.2 The Pilot is Ready for Takeoff

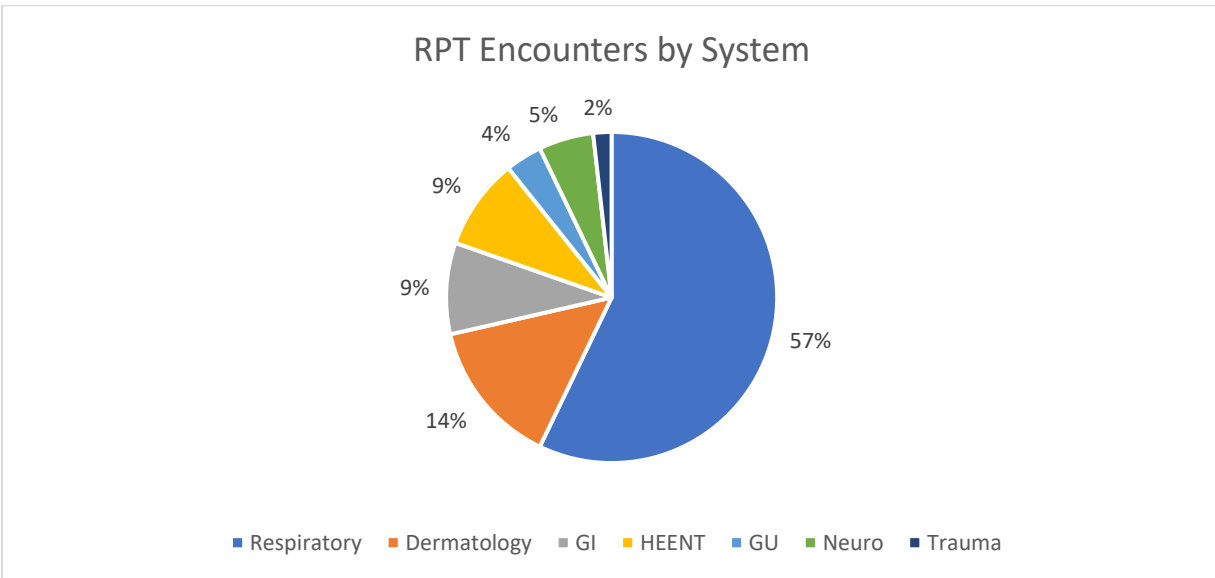
Soon after, the feasibility study began evaluating how remote presence could be leveraged to triage children being considered for pediatric interfacility transfers. In the period of about 14 months, we enrolled 38 patients to the study, and the results were compelling. We were able to manage the care of 63% (24) of the children in the community, with the remaining 14 children being sent to hospital (eight went to Saskatoon, and six were regionalized to either Prince Albert or Flin Flon) (Holt et al., 2018).

Children who did require hospitalization were stabilized prior to transfer. In some cases, the only reason the child had to be transferred was that they required supportive care, such as supplemental oxygen, and we did not have any in-patient beds or staffing around the clock to keep them. If we had a small hospital, we could easily have managed even more of the care on-site.

Most of the cases using RPT were respiratory conditions, including bronchiolitis, pneumonia, and croup. Dermatology was the next most common system with infected eczema, severe impetigo, and cellulitis being the primary conditions. Gastrointestinal cases included

jaundice, diarrhea, and dehydration. Issues affecting the head, ears, eyes, nose, and throat (HEENT) included acute otitis media, coxsackie disease and periorbital cellulitis. We managed a couple of cases of pyelonephritis (genitourinary system), as well as some seizures and coma (neuro) and a serious trauma involving a limb-threatening injury (see Figure 4.2).

Figure 4.2 RPT Encounters by System



The findings from the pilot are impressive, but they don't capture the whole picture of what was really happening on the ground. While the need to transfer and the final disposition is important to consider, particularly from an 'efficiency' standpoint, to me, the most important thing is the quality of care that the children received.

As part of my preparation for writing this autoethnography, I spent hours watching the recorded videos from the encounters during the study. I admit it was painful to watch myself on screen, particularly in the earlier days of the project, when I was still a new NP. It was also illuminating and really helped me to see what was going on more objectively. Watching these videos in succession and chronological order also highlighted how my own practice evolved.

4.4 RPT as a Game Changer

There are many elements of remote consultations made possible with RPT that would not otherwise be possible. As the encounters discussed here occurred in the remote nursing station, the comparisons I make are between RPT consults and traditional telephone consults, or in some cases, not having a consultation at all. With a few exceptions, the use of RPT is not compared directly to face-to-face consultations, as this was not possible for an urgent point-of-care consult in the community. I think it is crucial to understand the local context, as this will serve as the baseline with which to contrast the changes, as well as to highlight the significance of the impact RPT can have.

4.4.1 Process for Consultations

It is relevant to understand how the process differs between remote presence consultations and telephone consultations. I will also briefly review the process for Telehealth consultations to highlight why it is not a feasible option for point of care access in acute situations. There are different processes for consultations depending on the situation, but I will primarily focus on consultations for acute care.

Telephone Consultation

Earlier, I described the existing process we had to consult a physician after hours, including faxing a form to the emergency department in Prince Albert, which was then triaged by the nurse, and waiting for a response from the physician, either by phone or by fax. If a transfer was necessary, the policy from FNIHB was that the patient had to be sent to the nearest hospital, which in our case, was in Flin Flon.

As an NP, I was now able to access Acute Care Access Line (ACAL), a service that NPs and physicians can use to contact specialists for a telephone consultation for acute or emergent

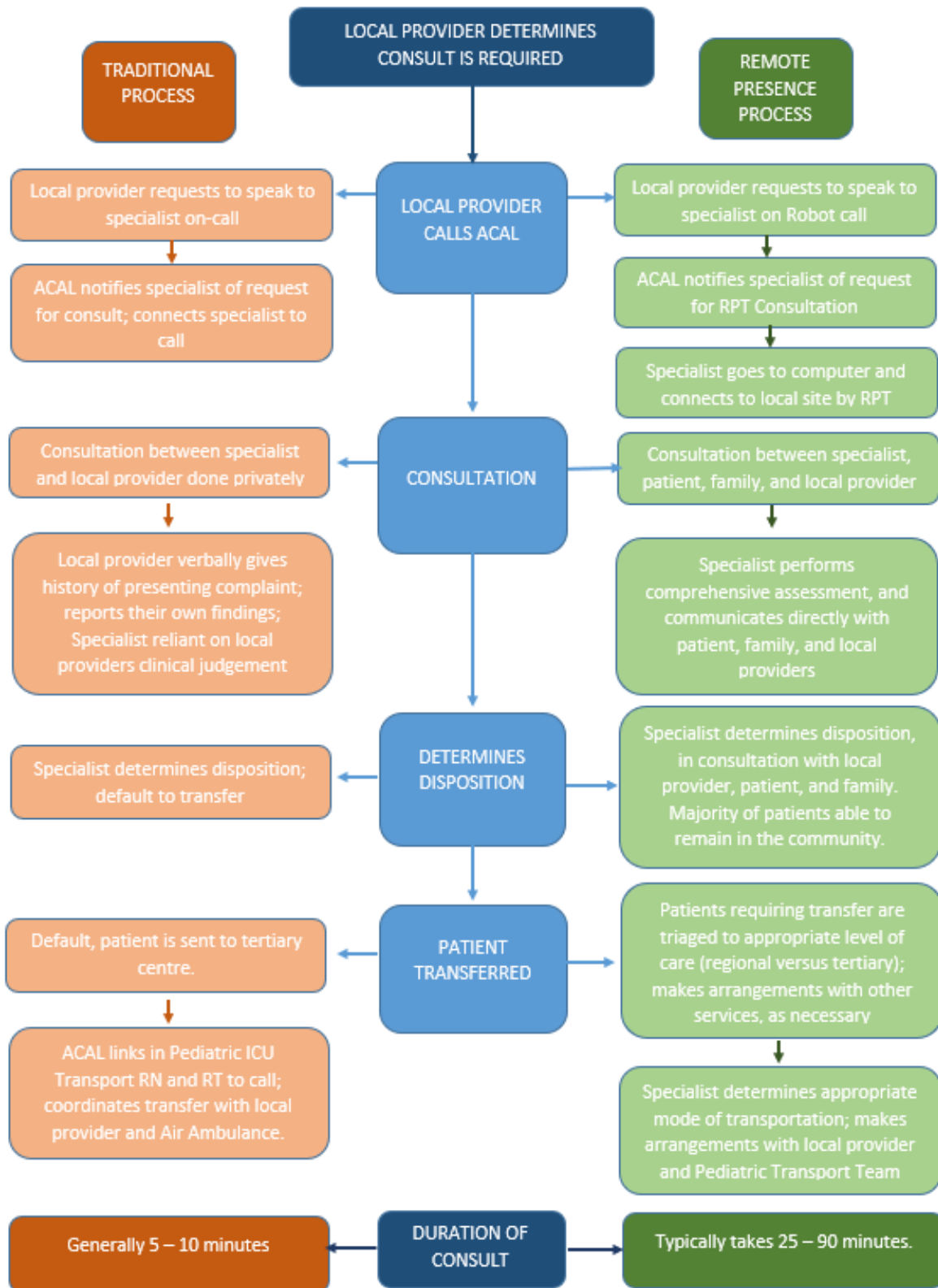
cases. This access did help us to bypass the need to consult the physician in Prince Albert for most things, which meant we could send some critically ill patients directly to Saskatoon or Prince Albert instead of Flin Flon. In general, a provider uses ACAL for patients they want to transfer to hospital.

To have a consult, the local provider calls ACAL and requests to speak to the relevant specialist. The dispatcher gathers the basic demographics of the patient, notifies the specialist, who then connects to the call and does the consultation with the local provider. This phone call often is done in a different room from the patient, in large part, because it is usually quieter. I think there is also an element of an inherent discomfort with talking about someone to another person in front of them. This places the patient and their family in a passive position, where the decisions for their own healthcare are made for them, on behalf of them, and by people who have more power than them. Telephone consults through ACAL generally take about 5-10 minutes, and the baseline outcome is typically to transfer the patient, with the nurses often having to make the travel arrangements themselves.

Remote Presence Consultation

During the pilot, the process for doing a remote presence consultation was for us to contact the Pediatric Intensivist directly. Now that remote presence has become a permanent process, it has been streamlined to go through ACAL, similar to the Telephone consults. When the local provider calls, they can either request a consult with the specialist on 'Robot Call,' or they can speak to the specialist through the system and request the remote presence consult (see Figure 4.3).

Figure 4.3 Process Map for Acute Consultation



The specialist can access the remote presence software on their computer, smartphone or tablet and immediately connect to the RPT at the local site. Once connected, the specialist can see and be seen, as if they were there physically in the room. The consultation would follow a similar way as if the specialist were called to do an in-hospital consult. The provider presents the case, the specialist can get more history from the patient and family, as well as other relevant information from the provider, and perform a comprehensive examination. In the case of the remote consult, the specialist will have to rely on the local provider for assistance to do some examinations, such as auscultation and use of other peripherals, and to perform some relevant maneuvers as directed by the specialist. The consultation is done while communicating directly with the patient, family, and local providers, and the decisions on the care plan, including determining the appropriate disposition, are made collaboratively.

These RPT consults typically take 25-90 minutes, however, the majority of patients are able to remain in the community. Those who do require transfer can be better triaged to the appropriate level of care (regional versus tertiary centre), with the specialist determining and facilitating the appropriate mode of transportation, taking into consideration resource constraints and other relevant local factors.

Telehealth Consultation

Across the North, access to specialist services is limited. Telehealth has filled some of the void, but with the scheduled appointment model used by Telehealth, it is not possible to access these services in acute or emergent situations. In general, I rarely referred a patient to a specialist specifically for a Telehealth visit. Typically, I would write and fax a referral to the Specialist (or Group Referral), and then the specialist would decide whether to do this visit in person or by Telehealth. If the appointment were to be done by Telehealth, the specialist's office would send

the request to their Telehealth Coordinator, who would then schedule the visit typically weeks or months ahead and make an arrangement with the local community Telehealth Coordinator, who would then communicate either with the clinic's Transportation Office or directly with the patient.

When the time came for the appointment, both parties must travel to their respective Telehealth sites, and the Telehealth Coordinators are required at each end to establish the connection. At the local sites, the Telehealth system was often located in a board room or conference room, as it was in our case, or fixed to a wall in one exam room. I would usually only find out that they had the visit over Telehealth when I eventually got a report back, sometimes months later.

Telehealth has had, and continues to have, a significant role in improving access to care in the North, however, the inability to access the specialist in real-time at point-of-care in urgent and emergent situations leaves the patient vulnerable.

4.5 Improved Quality of Care

When discussing anything related to health care initiatives, the single most important thing to consider is the effect it has on the care and wellbeing of the patient. Evaluating the quality of care can be difficult, however, we can adapt some standard outcome measures, such as morbidity and mortality rates, safety of care, admission rates, patient experience, effectiveness of care, timeliness of care, and efficient use of resources (Tinker, 2018). Some of these measures were addressed in the publication on the pilot project (Holt et al., 2018).

4.5.1 Morbidity and Mortality

While there was an inherent benefit to using RPT in virtually every encounter, if immediate specialist support via RPT had not been accessed, then at least 12 children would

have been at significant risk of having serious morbidity or mortality outcomes. There were several children who either presented with sepsis or were rapidly heading that way. With expert guidance, we were able to recognize what was happening and promptly initiate early goal-directed therapy to reverse the sepsis and stabilize the child. The best outcomes occur if we can reverse the septic shock within 90 minutes of onset; early treatment decreases complications of morbidity and mortality. From our clinic, realistically, we would not be able to get the child to any hospital within that 90-minute window. The resuscitations we did with RPT went much smoother and were less stressful, so far as a resuscitation situation can be.

Other critical cases that presented included a comatose patient, as well as some with severe soft tissue infections or a serious injury that was potentially limb-threatening or vision-threatening. In one case, a different specialist who had been contacted initially refused to accept the patient, leaving the team in a bind on how to get the emergent service that was required. Dr. Holt was able to intervene and facilitate the care. In all cases, the children could have the appropriate care initiated sooner, potentially preventing significant morbidity.

4.5.2 Safety of Care

Safety of care refers to medical mistakes made related to the care of a patient (Tinker, 2018). The measures used by many institutions include outcomes such as skin breakdown (pressure ulcers) and nosocomial infections, however, I do not think these pertain to our situation. Instead, a more relevant metric would be to evaluate the appropriateness of an intervention, such as antibiotic use. That said, one could argue that preventing hospital admission for most patients reduced their risk of nosocomial infections.

It is widely understood that antibiotics can serve a vital role in treating certain infections, however frequent or unnecessary use increases the risk of developing resistance and can have

dire consequences in the long run (PHAC, 2019). Unnecessary prescribing of antibiotics includes treating viral infections, prescribing the wrong antibiotic for the microbe, or using an incorrect dosage or duration of therapy (PHAC, 2019). Taking antibiotics inappropriately is another risk for developing resistance. Missing doses, taking too much or too little, stopping too soon, or taking leftover antibiotics or any antibiotics not prescribed are all problematic behaviours (PHAC, 2019). All these issues were rampant in the community.

From the perspective of a provider, I believe that antibiotics were prescribed excessively for a myriad of reasons. First, the overall health of the community was generally quite poor, much of which can be attributed to Social Determinants of Health. For example, housing was often subpar, with issues of overcrowding, and not all homes had running water. The source of heating was often a wood-burning stove, which can exacerbate respiratory issues, as does smoking and second-hand smoke exposure. With the children, I found the prevalence and severity of infections such as impetigo, cellulitis, acute otitis media, dental caries, bronchiolitis, pneumonia, scabies, to be profound. There were many times that even when it likely started as a viral, I suspected a secondary bacterial infection and would prescribe antibiotics to cover my bases. Patients routinely presented for back-to-back courses of treatment, particularly for skin infections. The initial infection improved with the antibiotics, but the conditions leading to the infection in the first place were never resolved, and patients would develop a new infection shortly after the course of therapy was completed. That, or the patients did not take antibiotics as prescribed, and the infection did not fully resolve.

Also, there was the issue of patient demands for antibiotics, even when the condition was likely of viral etiology, and, as the provider, you become the gatekeeper and can get worn down. Some nurses were more liberal with prescribing antibiotics than others. There was a large group

of casual nurses who cycled through, which does not promote continuity of care. Not to mention, the paper charts were disorganized, and it took a lot of effort and time to review the chart thoroughly enough to find the antibiotic history. While the chronic medications were marked down on a record, short course treatments were only documented (usually) in the notes. I did routine chart audits of the children with chronic conditions. I was shocked and appalled to see that some children had been prescribed 10 – 15 courses of antibiotics before their first birthday, and often the same antibiotic was prescribed repeatedly in short succession. I also appreciate how this happens, and indeed I was a culprit myself.

From the review the videos from the pilot, there were eight times that a course of antibiotics was either probably or definitely prevented, or a more appropriate agent was selected. Notably, six of the eight cases occurred with the first half of the patients seen during the pilot, and it only occurred twice with the second half of the group.

One particular case of averted antibiotics sticks with me. During this encounter, the NP and specialist incidentally identified a cluster of symptoms and recognized an early community outbreak of an infection. The NP and specialist developed an anticipatory plan of action if subsequent patients presented with the same symptoms, thus this one encounter likely prevented many more children from being put on antibiotics.

In another two occurrences, the specialist decided against initiating empiric treatment because they could see the patient directly. This decision meant the patient could wait to meet the Pediatric Transport Team to have cultures drawn (we were unable to do this at the clinic) before initiating treatment, thus providing the ability for the specialists to optimize the management at the hospital.

There were two occasions when the specialist wanted to use a particular antibiotic that our clinic did not stock. A different, perhaps suboptimal, agent was used instead. These cases resulted in our clinic beginning to keep more antibiotics agents, so they would be available to be used for subsequent patients.

4.5.3 Disposition and Admission Rates

The rate of readmission is one measure that many hospitals and health systems use to evaluate the quality of care. In our case, looking at the admission rates, or more specifically, the final disposition, is more relevant. As stated earlier, the initial intention of the pilot was to see if RPT would be an effective tool to mitigate the need for interfacility transfer.

By this metric, RPT was effective at lowering the rates of interfacility transport and resulting admissions. Of the 24 children triaged to remain in the community, none required admission to hospital within two weeks for the same (or related) issue. This indicates that we safely and effectively managed their care in the community (Holt, et al., 2018). Interestingly, the researchers found that it would take an average of five days for a child transferred to hospital to return to the community, even if the transfer was not necessary in the first place (Holt et al., 2018).

A more in-depth examination of the encounters, with consideration of what the protocols were at the time, I determined that the consultations using remote presence changed the disposition for the majority of the patients (see table 4.1). Twenty patients were able to have a 'step down,' meaning they could safely be managed at a lower level of care (i.e., be regionalized instead of going to a tertiary centre, or remain in the community instead of being transferred to hospital). In 11 of the cases, the patients were triaged to a higher level of care than they would have gone to, and in seven cases, there was no change in what the original disposition would

have been. A child with a limb-threatening injury or in a comatose state would always have been sent to the tertiary centre; likewise, a child with coxsackie disease would not have been intended to be transferred in the first place.

Table 4.1 Change in Disposition due to RPT Use

Disposition	n
Step Down – Lower Level of Care	20
Step Up – Higher Level of Care	11
No Change	7

4.5.4 Patient experience

Patient-reported outcome measures are one way that institutions evaluate patient experience (Tinkle, 2018), however, we did not formally evaluate this during the pilot, aside from a basic patient survey the parents were asked to complete. Many did not. More importantly, I do not feel equipped to interpret the data and determine the significance without a patient partner leading the process.

Patient experience is inherently subjective, however, there are some objective findings I witnessed that, in my own worldview, may have some merit. I believe that the use of RPT was generally a positive experience for patients and families (see image 1). Still, it is my own subjective impression of the encounter, and the participants or community members have not validated the significance. Dr. Holt did evaluate patient experience in her own Master’s Thesis. The title begins with “She is in there” which was a direct quote from a child who had experienced the robot in several encounters (Holt, 2019). Dr. Holt interviewed this child, their parent, and myself as part of her research, and the findings are congruent with what I believe

other families experienced using RPT. Namely, an initial skepticism which quickly evaporated into confidence that their child was receiving the appropriate care, and, when triaged to stay, an appreciation for being able to remain in the community, as transfers and admissions were extremely disruptive for them and their families (Holt, 2019).

Figure 4.4 Patient giving Dr. Holt a remote hug (photo used with permission)



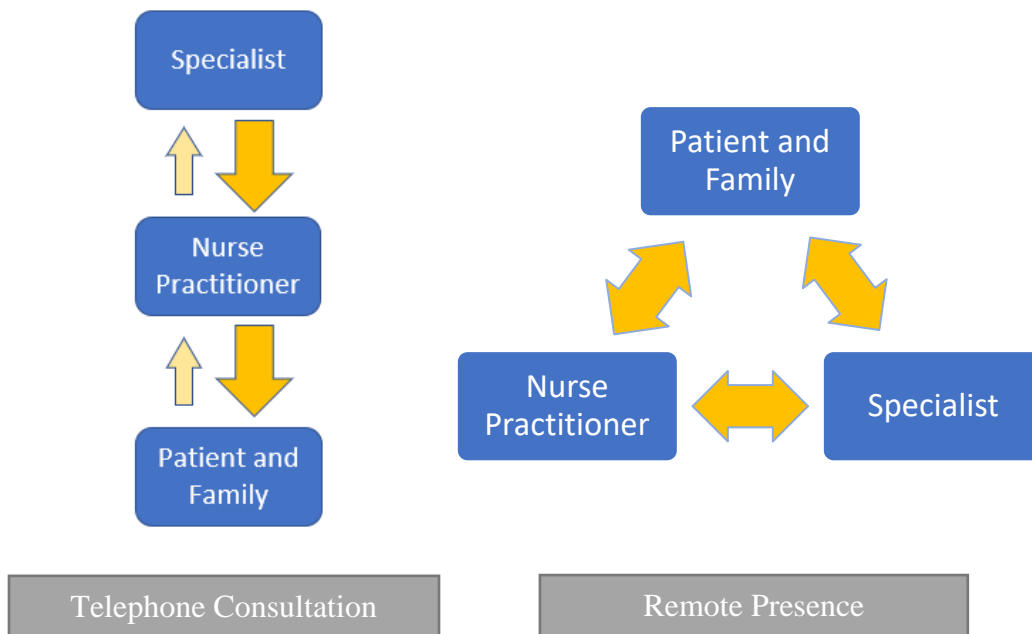
From my own experience during the encounters, and what I witnessed during the video audits, using RPT meant that more family members could be present and participate in the consultation and hear the information. Importantly, often the knowledge holder and primary carer for the child in the family was the Kokum or Auntie, particularly (but not always) in the case of younger parents. They were able to contribute vital history that the parents were not able to articulate themselves. I suspect this also led to a greater likelihood of pressing questions being asked than if the parent was alone in a face-to-face consultation.

Several times, families were actively engaged in the examination. Sometimes one of the parents would be able to assist with the examination and even using the stethoscope with the specialist. You could see their expression light up when they heard their child's heartbeat or the lung sounds, and they demonstrated more of an appreciation of the condition. In a more critical situation, while the nurses were very busy completing hands-on procedures, the specialist was able to see that the family members were visibly upset and drove the robot over to them to provide comfort and reassurance and could explain what was happening and why. You can see the mother's demeanour actively change from crying and distress to a more relaxed affect after talking directly with Dr. Holt.

By including the family in the whole consultation, whenever possible, decisions for disposition primarily were influenced by the family's needs. In several instances, the decision about whether to transfer to either Prince Albert or Saskatoon was determined based on where the family had more supports. In one case, while the patient was clinically stable to go to Prince Albert, a family member timidly mentioned that the child's mother was at RUH in Saskatoon with another sick sibling. I was not even aware of that! It made so much more sense to the family for this child to be transferred to Saskatoon, so he was. What was best for the family was best for the child. If this had been a telephone consultation in another room, the decision would have likely been just to transfer him to Prince Albert, and the family would have been told what the plan was. In another circumstance, while the child may have been medically stable to remain in the community, other factors prompted a transfer. One child had a pediatrician appointment in Prince Albert the next day and would have to travel by the communal taxi to the city to attend the appointment. It was determined that this posed a safety risk to the child, so we were able to transfer him down that night.

I see this model of care as a disruption to the traditional power balance in many ways because it alters the direction of communication (see Figure 4.5). The local provider is the gatekeeper between the patient and the specialist. They relay the information they deem necessary to the specialist, and the specialist determines the intervention for the patient. The local provider then informs the patient and sets the plan of action in motion. It is a very hierarchical, top-down approach. While RPT can never truly erase the power imbalance that the health care professionals hold, it can facilitate more of a dispersion of the power, with the patient and their families being at the centre of the care, and more openness and transparency from the providers.

Figure 4.5 Direction of Communication: Telephone Consultation versus Remote Presence Consultation



4.5.5 Effectiveness of care

Effectiveness of care typically refers to the application of best practice guidelines (Tinker, 2018). From my perspective, I can see a drastic improvement in the application to best

practice guidelines throughout the study. My skills and practice became more refined through the coaching and mentorship from the specialists.

The most prominent example was how much we refined our management of bronchiolitis, a respiratory disease frequently caused by RSV. Children with bronchiolitis often presented to the clinic during and after hours. In Canada, it is the most common lower respiratory tract infection (LRTI) in infants under the age of one and is a leading cause of hospitalization for this age, with between 1% to 2% of young children hospitalized with this every year (Worrall, 2008). I do not have the data indicating the rates in this community; however, I would not be surprised if the numbers were much higher than average. In fact, I would be surprised if they were not higher than average. While many of us are comfortable managing URTIs without antibiotics, the same was not always true for LRTIs, myself included. These children present with an LRTI, often have some level of respiratory distress and increased work of breathing, with wheezing and crepitations on auscultation and have high fevers. Many providers prescribe antibiotics and salbutamol as the first line of treatment. I know I certainly have. Our approach was almost uniformly opposite from the best practice guidelines, which discouraged antibiotic and salbutamol use, favouring supportive management, including saline nebulizers (CPS, 2014).

A direct result of working with the specialists using RPT, my colleagues and I got the mentorship to hone our clinical judgment in pediatrics. Our management of bronchiolitis began to align more closely with the guidelines put forward by the CPS. As this was such a common issue that we saw, Dr. Holt provided us with an in-service via the robot, specifically on managing bronchiolitis. The refinement in our approach to managing this common condition was one major factor in reducing unnecessary antibiotic prescriptions, as discussed above.

4.5.6 Timeliness of care

Many ED's across Canada and internationally use the validated CTAS (Canadian Triage Assessment Score) system as a benchmark for time to care based on acuity levels (see Table 4.2). When patients present to the ED, they are triaged and given a score between 1 and 5 based on the acuity of their presenting condition. A CTAS Level 1 is a resuscitation situation for a condition with immediate risk to life or limb, or imminent risk of deterioration without immediate aggressive interventions. Examples of CTAS Level 1 are cardiac arrest, severe respiratory distress, or serious major trauma (Bullard et al., 2017). CTAS Level 2 is an emergent situation for conditions with a potential threat to life, limb, or function. This can include probable myocardial infarction, stroke, altered level of consciousness, septicemia, severe abdominal pain. CTAS Level 3 is an urgent situation where the condition could potentially progress to a more serious condition but are generally relatively stable at the moment. CTAS Levels 4 and 5 are less urgent or non-urgent, for example, a urinary tract infection, mild diarrhea, minor bites, dressing changes, or medication requests. It is important to note that CTAS Levels 1 and 2 have a high risk of death or morbidity.

Table 4.2 Time to care by CTAS Level (Bullard et al. 2017)

CTAS Level	Situation	Time to Nurse	Time to Physician
1	Resuscitation	Immediate	Immediate
2	Emergent	Immediate	15 minutes
3	Urgent	30 minutes	30 minutes
4	Less urgent	60 minutes	60 minutes
5	Non-urgent	120 minutes	120 minutes

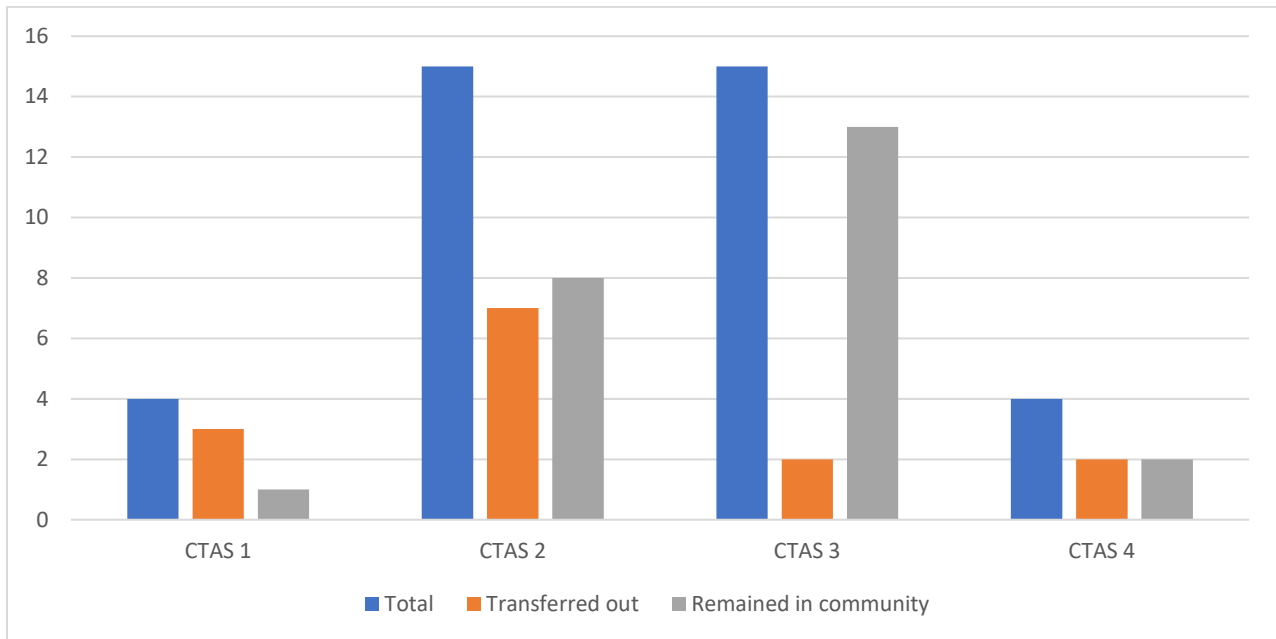
In pediatrics, a child triaged at a CTAS Level 3 could quickly become a CTAS Level 2 or even a CTAS Level 1 if appropriate interventions are not started in a timely manner. I find that kids, more so than adults, can remain stable for a lot longer, but then once they take a turn for the worse, they deteriorate rapidly. They also tend to respond to treatment faster.

Triage in pediatrics uses the same system but with the slightly modified PedCTAS, which is adapted to a pediatric population. In the 38 patients seen during the pilot, the average PedCTAS score was 2.5, of which 50% were either a CTAS 1 or 2, and the other 50% were CTAS 3 or 4 (see Figure 4.6). There were no CTAS 5's. For the 19 children who were a CTAS 1 or 2, the practice standard is to see a physician immediately or within 15 minutes. Without RPT, that is simply not possible.

Interestingly, of the four patients classified as CTAS Level 1's, one of them was stabilized enough and was actually able to remain in the community after the resuscitation with close monitoring and planned follow-up. On the other hand, despite being a lower acuity, two of the CTAS Level 4's required transfer out of the community. This is contrary to what my assumption was that all CTAS Level 1's would automatically require transfer to hospital, and that CTAS Level 4's would be kept in the community.

The bulk of the patients were either a CTAS Level 2 or a CTAS Level 3 (15 patients each), with the target to be seen by a physician within 15 minutes or 30 minutes, respectively. In good conditions, the nearest hospital was 75 minutes away, however, the closest pediatrician was 4 hours away by road. Even to get to the closest airstrip would take a minimum of 45 minutes, and it would take us further away from help if there were an issue with either the patient or the plane.

Figure 4.6 CTAS Levels by disposition in pilot.



Using CTAS scores is a useful way to illustrate that RPT can be a vital tool to improve timeliness to care, however, it is worth noting that it is based on mostly RNs and Physicians working in hospital-based EDs and has not been validated for NPs working in remote nursing stations. NPs have a broader knowledge base and scope of practice than Registered Nurses. I have used the CTAS system as a proxy for local providers to access expert support at the point of care when it is needed most. The local providers initiated all these remote presence encounters, demonstrating a self-identified need for support.

4.5.7 Efficient Use of Resources

Using healthcare resources efficiently and appropriately is important to measure for the overall sustainability of the healthcare system. Tinkle (2018) proposed the measure of efficient use of medical imaging, however, that is not relevant in our case as we did not have access to any medical imaging on-site. I have adapted this concept to a broader idea of efficient use of resources and use medical transportation as the surrogate for this measure.

Pediatric interfacility transportation was the primary measure of the pilot project. The pediatric transport team provided specialized pediatric interfacility transportation for the entire province. During the study, 63% of patients were triaged to stay in the community and did not require transportation, resulting in a cost-saving of \$240,000 in transportation costs and prevented admissions. A further \$120,000 was saved in prevented hospital admissions, for a total cost savings of \$360,000.

Extending beyond the pilot, there were a few times that there were children in other communities who also required urgent transportation to Saskatoon. Because the specialist could see our patient and stabilize them in the community, our patient was triaged to be transported later. This is a clear example of how RPT can help optimize a critical yet limited resource, in this case the Pediatric Transport Team, and how it can have a ripple effect for communities across the province.

On the other hand, in terms of efficient use of resources, there were times that the decision was made to transport the child to hospital by plane, even though from our local teams' perspective, they were stable, and it was reasonable to go by road. Sending the peds team was likely overkill. At times this could be beneficial if it made things easier for the patient and family. However, there were also times that it became burdensome for the local centre. For instance, there were some situations where the plane was delayed by many hours because it would not be back in time for shift change or had to transfer another child. By the time the flight was ready, the patient could have already made it to the hospital. This delay also kept the nurse at the clinic for hours after hours, which can be a significant burden and strain on that important resource at the local level.

4.6 Elements for Successful Encounters

Successful remote presence consultations can improve the care that patients receive. As such, it is useful to consider what elements promote successful encounters. I will identify key elements that occur at the provider level and the technological level.

4.6.1 Elements – Provider Level

In remote presence encounters, there are generally providers at both ends, including the expert provider and the local provider. This is not to say that local providers lack expertise, but in general, they are working with the patient and consulting with another provider with specific expertise relevant to the case. At both sides of the robot, the providers can be any discipline of health care professionals and even can be a layperson in some circumstances.

Provider Personality

As with any encounter, be it in person, over the phone, or using a form of videoconferencing, the personalities of the providers on either side will factor into the success of the visit. In terms of remote presence consultations, I think an openness to change and having patience to figure out how to work together in this new way are key traits that both providers should possess. At the local level, there is a degree of vulnerability that providers have during these consultations as they are becoming the 'hands' of the specialist and are being directly observed. Having a combination of confidence and humility, owning what you do and don't know, and not being afraid to ask for help is necessary to engage successfully.

Communication Style

Closely related to provider personality is communication style. At the most basic level, maintaining a respectful attitude and collegiality is fundamental for a successful encounter. Remote presence encounters require the providers to communicate much more intentionally with

each other. The specialists need to communicate with the local providers to assist with assessments and coach procedures effectively.

Diplomacy is a valuable skill as there are times that the expert provider will disagree with the local provider's approach, often in the presence of patients and their families. Diplomacy was something with which Dr. Holt was exceptionally skilled. There were many situations where she had to intervene and adjust an inappropriate treatment plan that I, my colleagues, or the physician had decided. She consistently navigated these situations incredibly well, treating it as a teaching opportunity, while also building up the family's confidence in the care provided by us.

Unless patient safety is at risk, it is not helpful to anyone to undermine the local provider. Throughout my career, I have had my fair share of negative experiences when trying to consult with an abrasive physician or specialist, and I genuinely believe that it affects patient care and safety. While it is uncomfortable enough to experience this over the phone, it can be even more intimidating when they are effectively looking over your shoulder and judging you. I am aware of a few instances when local providers felt a negative attitude toward them by a specialist, and they immediately lost any buy-in they had for using remote presence.

Champions

Not everyone will be an early adopter, which is not necessarily a bad thing, but it is useful to have a champion who can take the lead and become a “super-user”. That said, I think it is detrimental to become solely reliant on one or two people to use the technology. While it can be helpful to have a champion comfortable with the technology, they should mentor their colleagues and not be expected to take over every case. Having an overreliance on one individual puts them in the position as a 'linchpin' in the system, and while it may be useful during an encounter when they are present, it does not create a sustainable program.

We encountered this issue in our clinic. Regularly colleagues would ask me to come “help” with a remote presence consultation, only to be “given” the case to take over. The number of consultations that occurred dropped drastically when I was away. Similarly, I was more hesitant to request a consultation when Dr. Holt was not on call for us.

Beyond the direct providers involved in the remote presence encounter, there are also the attitudes of the teams. I personally experienced backlash from some colleagues, including overt bullying from one person, over the use of remote presence. RPT is a disruptive technology, and as such, disrupts the existing processes and the status quo. Some of my colleagues found this threatening, and I was acutely aware of it. It took some time, but most of my colleagues got on board with it.

Collaborative Approach

Collaboration and mentorship between specialists and the providers at the patient site are inherently built into this model of health care service delivery. Developing care plans together means that everyone is on the same page and has the same information. It offers an opportunity for knowledge transfer, for instance, new best practice guidelines for disease management, red flags, or getting clarity on the “gray” areas. By becoming the 'hands' for the physician or specialist, the local provider can be coached for new skill development, such as obtaining difficult IV access, airway management, and refining examination skills.

Collaboration can result in increased communication, collegiality, and trust between the providers and decreases professional isolation. Local providers can gain confidence in the care they give and have increased capacity to manage more complex patients safely. Furthermore, the communities can have increased trust in the care they receive, knowing that specialist support is available when needed, and confirmation that the local providers are doing the right things.

4.6.2 Elements – Technology Level

In my opinion, the key elements that set remote presence technology ahead of the other options for consultation are the flexibility for use in different situations, the portability of the device, and access to peripherals for advanced examinations. These features highlight the adaptability of the technology and serve to facilitate successful encounters in virtually any situation. On the other hand, technical difficulties can act as a significant barrier.

Flexibility

The process for doing a remote presence consultation is much more flexible than telehealth. The nature of the direct provider-to-provider communication and the ability for the expert provider to connect using their own device, be it their computer, tablet, or smartphone, means that there can be an immediacy to the access. It facilitates the local providers to get the support they need, when they need it, and where they need it. Indeed, Dr. Holt did an urgent consultation on the side of the highway on route to Regina.

Portability

At the local site, the provider can take (or drive) the device to the patient, rather than moving the patient to the technology. This portability is significant because it means it can be used in the emergency room to see critical patients, in a clinic room for a stable patient or follow-up, in the healing room to provide counselling and support, or even in an office to meet with the team. It adapts to the requirements of the situation, not the other way around.

The line of RPT products is varied. Some devices are handheld, roughly the size of a small briefcase, and can be used anywhere there is Wi-Fi, including being taken on home visits or to accident scenes. On the other end of the spectrum, there are autonomous driving devices, and with a click of the button, the robot drives itself to the selected location.

Peripherals

The access to peripherals, such as a stethoscope, dermatoscope, and ophthalmoscope, means that more advanced examinations are possible. A secondary benefit is that they can serve as a valuable teaching tool. For example, the ability to auscultate with the specialist in real-time means that we hear the exact same sounds creating the opportunity to refine our own assessment skills. *"Did you hear that lung sound?.....That one, it sounded like a 'click'. That is what I was unsure about"*. I can not tell you how many times I have heard something on auscultation that the next provider could not reproduce.

Technical Difficulties

The success of an encounter largely relies on the strength of the connection. Technical difficulties serve as a significant source of frustration. In Saskatchewan, we have relatively good access to the internet across the province, in large part due to having a Canadian crown-owned telecommunication corporation, SaskTel. In the North, most populated areas have access, however, in between communities, there is usually no service at all. The bandwidth is also more limited, although it is usually sufficient for the RPT to function.

From the video audits, there were 12 of the 38 encounters (32%) that had some form of technical issue, most of which were relatively minor. In half of these cases (6), there was an issue with an echo or feedback. This typically happened when the specialist was not using a headset, and usually only lasted for a couple of minutes, and generally did not have any significant impact on the encounter. There was only once that the echo was problematic enough to disrupt the consultation, but it was resolved by disconnecting and reconnecting right away.

The sound was an issue in an additional two encounters, including once when the stethoscope volume was too low (the provider had the 'switch' on the wrong setting), and once

when the provider was using a new computer and the settings were not configured correctly. In this circumstance, the video component was still useful, and we made do by talking on the phone and used the video footage for the assessment. There was one time that the provider forgot the password, delaying connection for a few minutes. Finally, there were four times (11% of encounters) that the internet connection was slow, however, it had minimal impact on the encounter. In these cases, the connection was occasionally choppy, with interruptions lasting a few seconds. It sometimes resolved on its own or if the specialist switched the internet connection on their side but did not affect the ability to conduct the consultation.

4.7 Conclusion

Our experience using RPT to deliver quality care safely demonstrates that increased point of care access to expert providers and specialists help to reduce the health disparity of rural and remote residents. Superior acute care for residents living in rural and remote communities in northern Saskatchewan is not possible now. In critical or emergency situations, it is crucial to have immediate access to specialist support. This can mean the difference between life and death. The fact that the specialist can autonomously use the RPT means that the local providers are freed up to care for the patient with the specialist direction and support. If the patient had presented to an urban hospital, an urgent pediatric consultation would be requested. For the first time now, children in the North can get a similar level of care as their urban counterparts.

Access to specialist care using RPT significantly reduced the need to transfer patients out of the community. For patients remaining in the community, the specialist can provide follow-up care as required. In situations that a transfer was not preventable, the final disposition was often changed to a more appropriate level of care. In some cases, the patients were sent to a higher level of care directly without having to, by default, go to the closest hospital first, thus delaying

access to the specialized care they required. Other patients could be regionalized, remaining closer to home, and keeping higher acuity beds available.

The change in final disposition is a result of many factors, such as initiating early goal-directed therapy and stabilizing the patient in the community, also more appropriate triage. Decisions for management, including disposition, can be discussed with the local providers, the patient, and family, allowing for more patient and family-centred care. Without RPT, these conversations are typically done over the phone and only between the specialist and local provider (usually a physician or a nurse). This excludes the patient and the family from the decision-making process.

The adaptability of the RPT to be used in countless situations is a significant strength, however technical issues can prove to be a challenge. Facilitators to successful encounters using these devices include positive attitudes and an openness to change from the local providers, strong and respectful communication skills, supporting local champions, and maintaining a collaborative approach. Working collaboratively ‘provider to provider’ also reduces the risk of unnecessary or inappropriate treatments. The mentorship gained by using RPT in practice can have long-lasting benefits beyond the one patient.

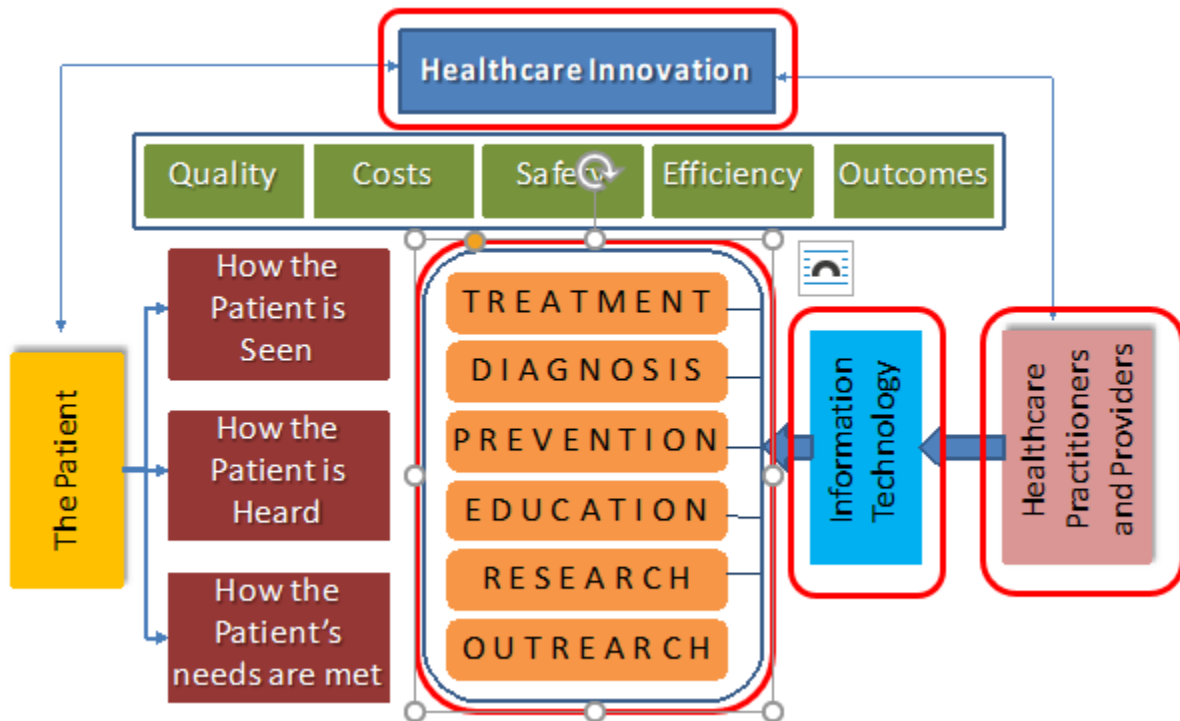
CHAPTER V: AUTOETHNOGRAPHY PART II

5.1 Prologue

Chapter V is the second part of this autoethnography, and focuses much more specifically on the NP role, and how RPT effected my own practice. This chapter addresses the final component of my second research question: How does the use of RPT impact the NPs practice?

In terms of the conceptual framework, this chapter relates directly to the providers and practitioners (see Figure 5). Whereas in Part 1 of my autoethnography, I essentially discuss how RPT changes the care patients *receive*, Part II looks at it from the opposite perspective, namely how RPT changed the care *given* to patients.

Figure 5 Conceptual Framework, Areas Addressed in Chapter V



5.2 An Autoethnography of a Nurse Practitioner Using Remote Presence Technology in an Isolated Community: Part II

I love being a nurse. I mean, I really, really love being a nurse. A lot of people have asked me why I did not go into medicine instead of becoming an NP, implying, or sometimes outright stating a “just” preceding the NP. I think most people fail to recognize how special the NP role is. I am not a doctor, and never pretend to be one. As an NP, my scope of practice has a significant overlap with that of a primary care physician. While there are many things that a physician is more capable of doing, likewise there are many skills that I think are better situated for NPs. We each hold valuable roles within the health care team. Beyond the obvious differences in our education and training, it is also the philosophies that guide our respective practices that are inherently different as well. It is the philosophy of nursing that resonates with me and guides my practice.

Admittedly, I have considered medicine a few times throughout my career. But, when it came down to what attracted me to medicine, for example having broader scope of practice and autonomy, I realized that I could achieve that as an NP. I have a deep respect for physicians, but I also have pride for my own profession.

I have had an interesting career so far. As a new grad, I landed my dream job right off the bat, and started my career in the inner-city emergency department in downtown Toronto. My excitement quickly turned sour when I found myself working in a toxic environment – the classic *nurses eat their young* situation. I would get chastised for spending any time *caring* for a patient beyond the immediate presenting complaint, and any advocacy for the patient was discouraged. I found myself disenchanted with what it meant to be a nurse.

During that time, Toronto was hosting the International AIDS Conference, and by happenstance, I attended an event that featured an incredible artwork – an Altarpiece – created by a group of women in a small village in South Africa that was being ravished by the AIDS epidemic. Their message was that in the face of this despair, they held onto hope. Hope for the future; hope for treatment; hope for care; hope for help. I am not typically an emotional person, but I wept. Within days I had decided to go to South Africa to volunteer for six-months. Three years later I returned, with a new appreciation for nursing, and for what I was capable.

I spent several years working in Toronto in various capacities. I worked in an HIV hospice on and off, I took a temporary position in infection prevention and control (IPC) at a major hospital in Toronto during H1N1 leading the immunization initiative, I did palliative care, worked in a Positive Care Clinic at yet another major Toronto hospital, and finally settled in primary care at an inner-city community health centre. Aside from the brief stint in IPC, I worked predominantly with individuals experiencing homelessness, the LGBTQ community, and people living with HIV and Hepatitis C. In each of these positions I was able to work to the full scope of my practice and thrived. I wanted to do more, but still maintain the essence of nursing. Pursuing my NP was an obvious next step.

Despite being very much a ‘city girl’, I was always attracted to working in remote settings. In South Africa, I worked at the edges of my scope of practice. To some extent I was able to do this working in the inner-city, which was about as resource limited as it can get in a city as large as Toronto. When the opportunity presented itself to work in northern SK, to the surprise of everyone, including myself, I was all in. The initial move did not pan out as I had expected, but it eventually led me to the reserve I called home for several years.

5.3 Outpost NPs Enhance Access to Care

The NP role in Canada was pioneered by outpost nurses working in northern remote communities out of necessity to address the chronic shortage of physician services in these areas (Kaasalainen, 2010). There was a recognition that these nurses required advanced education and training to fill the gap in health care service access, particularly in Indigenous and Inuit communities (Kaasalainen, 2010). These early advanced practice nurses (APN) paved the way for the eventual formal recognition of the NP role.

NPs are ideally situated for practice in outpost settings. Given their advanced education, expanded scope of practice, skills and competencies, NPs provide high-quality primary health care services to these communities that would otherwise not be available (Tarlier & Browne, 2011). Tarlier and Browne (2011) argue that NPs – rather than RNs with additional certification – have a critical role for improving health and decreasing health inequity for Indigenous peoples, and that their involvement in remote communities should be viewed from a social justice lens. While I agree with how these authors view the role of NPs, I take exception to their arguments against RNs with additional certification from working in these settings.

In Saskatchewan we have the relatively new designation ‘Additional Authorized Practice’ (AAP) for registered nurses (RN) working with an expanded scope of practice in northern communities (SRNA, 2020). This replaces the Transfer of Medical Function (TMF) that allowed RNs to practice some restricted activities beyond their traditional scope in settings that had limited access to physician services. The new RN(AAP) designation requires RNs to take additional courses and establish clear parameters on the scope with which they can function by introducing Clinical Decision Tools (SRNA, 2020).

I have several concerns with Tarlier and Browne's (2011) argument against RNs with the additional certification. They argue that the use of these RNs replaces the need for NPs, and that NPs have a much more extensive training and a broader scope of practice thus implying that the RNs with the additional certification will not be able to provide the same quality of care (Tarlier & Browne, 2011). I think this is short-sighted, and serves to pit nurses against each other, specifically NPs against RNs, and diminishes the role and the value that RN(AAP)s can offer. First, there is a perpetual shortage of nurses working in the communities and restricting practice to only NPs would only exacerbate this issue, further decreasing access to care. Second, nurses who are from the communities themselves are invaluable for community engagement, advocacy, and are more likely to remain in the community. I believe that requiring an NP designation to work in outpost settings could have a negative effect by creating unnecessary barriers for people interested in working as a nurse in their own community. I think having both NPs and RN(AAP)s working collaboratively is a much more appropriate approach.

Additionally, I have a concern that the arguments these authors posit are the same arguments that the medical community have used, and continue to use, against the role and function of NPs. NPs have had to fight against physician associations, organizations, and even individual physicians and physician groups who lobby against us and create barriers through policies and measures aimed at restricting our scope of practice (Marceau, 2020). The Saskatchewan Medical Association (SMA) still have a position statement that states that "protocols need to be established in Saskatchewan so that every nurse practitioner always has a formal collaborative connection with a family physician(s)" (SMA, 2020), despite NPs being formally recognized and legislated as autonomous providers. I think that this protectionism is detrimental to the nursing profession and rather than try to diminish other nursing disciplines, we

should collectively seek to raise the standards and capacity at each level to further the nursing profession.

Finally, I am concerned that these views will serve to pigeonhole NPs to practice in rural and remote settings exclusively. This approach effectively promotes the perceptions that NPs should only practice in the north to the exclusion of urban settings. I firmly believe that NPs have a role in providing high-quality, comprehensive health care services anywhere and everywhere in the province and should not be limited to rural and remote settings.

5.4 NP Practice in Remote Settings

Working in a remote setting is both challenging and rewarding. It requires ingenuity and creativity to make do with the resources you have available. I first experienced this in South Africa, and it influenced my decision to become an NP.

Fast forward to November 2014. I had written my comprehensive exam and successfully completed my NP program a month prior, followed two weeks later by sitting for the national Canadian Nurse Practitioner Exam (CNPE). While I was still waiting for the results of the CNPE, I made the move to the reserve to begin my new role as a Grad NP. By this point, I had more than eight years of nursing experience under my belt and would reasonably be considered an expert nurse clinician (Benner, 1982). I was competent and confident. I was a strong nurse. I continued to work as an RN throughout my NP education, which I think served to further strengthen my confidence and expertise as a nurse.

I do not think I was prepared for how much of a chasm there was transitioning from being an expert RN to novice NP. I think it was a bigger jump than it was when I first became an RN. The safety wheels of being an NP student, and even an RN, were gone. I no longer needed

to get an order from a physician or an NP; I could make decisions and write orders independently. The weight of the final decision was on my shoulders and my own license.

The term *transition shock* has been used to describe the phenomenon of expert nurses becoming autonomous providers, a process which can be very disorienting and doubt-ridden (Fitzpatrick & Gripshover, 2016). I remember several occasions in those first few months where I would second guess something that I knew really well and had been confident doing as an NP student and RN. I fully experienced the imposter syndrome.

Working as an NP in an outpost setting has the added challenge of being required to function essentially as a ‘Specialist-Generalist’, in that the breadth of expertise you are required to have in order to deal with anything and everything that comes into the clinic is vast. I was lucky that I had strong, experienced NPs on the team who could support and mentor me, but it was still an extremely stressful period for me. In a way, it was an existential crisis for me as it challenged my own identity as a self-assured, confident, and competent nurse.

5.5 Work Confidence and Work Competence

A recent study conducted on nurses working in rural and remote settings in Canada highlighted how interconnected work confidence and work competence are, and can be influenced by perceived stress, work engagement, and burnout (Penz et al, 2019). Work competence relates to the knowledge, skill, and performance, whereas work confidence refers to the nurses self-perceived capability to perform the functions required in practice (Penz et al, 2019).

I found the results of the study accurately reflected my own experience working in the remote setting. Being a recently registered NP who was relatively new to the community had a negative effect on my self-perceived confidence and competence, however as time went by, my

confidence and competence increased. I think I was actually more competent than my self-perception was, largely in part because my confidence had been shaken.

Penz et al (2019) found that the further distance to an advanced referral centre decreased work competence. I have spent about half of my career working in remote settings, and the other half practicing in large urban centres, and have definitely felt a sense of more assuredness and security with having the safety net of a nearby hospital. When you are so isolated, there is much less room for error, and a lapse in clinical judgement could have much more serious consequences.

Another finding from the Penz et al. (2019) study that particularly resonated with me was the positive impact that interprofessional collaboration had on both competence and confidence. Having a professional support network, including my colleagues at the clinic, as well as access to specialist support in real time using RPT absolutely enhanced my competence and my comfort and confidence, particularly as I was transitioning into my new role.

5.6 Effect of Remote Presence on NP Practice

Back to November 2014, we had recently met Dr. Holt, a pediatric intensivist who was interested in providing consultations using RPT. In Chapter IV I described the first time I used the robot to consult with Dr. Holt. I was on-call, and a mother brought in her sick toddler. It was not a life-or-death situation, but I did not know what to do. I was pretty sure it was a viral etiology. I did not think she needed antibiotics, but her fever was much higher than I would expect, and she seemed sicker than I was comfortable with making a concrete diagnosis and determining the treatment plan. I just did not know. I called Dr. Holt, who enthusiastically agreed to do a remote consult, and in the end Dr. Holt diagnosed the child with coxsackie disease. It was viral. She did not need antibiotics.

I have described RPT as a game-changer before, and it bears repeating. The burden of the decision was taken off my shoulders. I felt relief. It was not a critical case, and in the end the treatment plan was not significantly different than I likely would have made on my own. The difference was that I was confident it was the correct treatment plan. I could go to sleep not second-guessing myself and worrying about the child.

This encounter also served to increase my own confidence and competence. I was probably at the height of the transition shock of becoming a novice NP, and the self-perceived confidence and competence I had enjoyed as an expert RN had been rocked to the core. I had only been practicing for a few weeks and there was a cumulative effect of the burden of every decision I had to make. By that point, I think I was experiencing decision fatigue. The nature of RPT meant that I was part of the consultation. Dr. Holt was affirming of what I thought and offered reassurance that I had been on the right track, that my judgement and instincts were not off. I went from feeling overwhelmed with uncertainty, to feeling validated and supported. The process of taking the history and performing the assessment together helped me refine my own approach and provided me with some clinical pearls.

I became the local champion for RPT and continued to work with Dr. Holt. Over the next 14 months we ran the study evaluating the feasibility of using RPT to decrease the need for interfacility transportation. I discussed this in more detail in Chapter IV. During the study, there was an unexpected bias introduced. As my capacity to manage more complex cases on my own increased significantly, I became less reliant on calling for a remote consultation, particularly for conditions that we routinely saw, such as bronchiolitis. In cases like this, if the case required a consultation, we had typically done a lot more of the initial management beforehand, and only called when we were not seeing enough improvement. Indeed, as an NP student I had completed

my pediatric placement at the renowned Hospital for Sick Children (*Sick Kids*) in Toronto, one of the premier children's hospitals in the world, yet I learned far more during my experience working remotely with Dr. Holt.

One of my responsibilities at the clinic was the Chronic Kids Program. There was a clearly identified need to improve the care and follow-up for children with chronic conditions. Many of these kids had previously been referred to general pediatricians down south, but the no-show rate was tremendous. A 15-minute consult could easily take two days for the round trip and required a parent or caregiver to accompany the child. This is just not possible for everyone. Of note, Dr. Holt is an Intensivist, and would not typically be doing general pediatric consults, however I think because of working with us using RPT, she was invested in the community and our kids, and was gracious enough to serve. We started scheduling remote pediatric clinics.

The remote pediatric clinics were a huge success. As the primary care provider for these patients, being present and able to participate in these specialist visits was invaluable. I could supplement or corroborate a lot of the history, and I was directly involved in developing the care plan. This meant everyone was on the same page, and I could facilitate the ongoing care. It closed the loop. Subsequently, if the child became unwell and was brought to the clinic later, we already had an established care plan. In the traditional process, my involvement would be to send a referral letter to the specialist, and then wait to eventually get a consult note back. Hopefully. A letter cannot replace a discussion.

Impressively, our no-show rate for the remote pediatric clinics was less than 5%, significantly lower than it was when patients had to travel to have the appointment. We could have a community health worker go to pick up the patient and bring them to the clinic. If childcare were an issue, the other kids could come as well. If caring for an elder was a problem,

we sent homecare. Because we understood the local context and the specific challenges that prevented people from attending their appointments, we were able to mobilize local supports to mitigate these barriers, ensuring that these kids were able to attend their appointments and get the appropriate care they required.

5.7 Different Applications

In addition to the pediatric acute care service, and the scheduled remote chronic kids' clinics, we added a few more services, including dermatology. This was a desperately needed service, identified by the community and local providers. Dermatological conditions were the second most common system for which we accessed RPT support. The director of Northern Medical Services (NMS) approached a dermatologist, who was willing to provide us with some remote clinics.

We also had a couple of “guest” specialists who Dr. Holt recruited to consult on specific cases. For example, while I was doing a well-baby check-up on a neonate, I detected a Grade IV murmur that I was concerned about. A murmur in a neonate can be a sign of congenital heart disease. Dr. Holt had a pediatric cardiologist come assess the infant over the robot. We did the examination together, including auscultation. I performed an ECG, and the specialist was able to read the strip on the screen, zooming in to magnify it. It was determined that the baby was stable, and it was likely an innocent murmur and he did not need to be sent to the hospital right away, and that he could wait and be booked in at the murmur clinic the following week for an echocardiogram.

I was particularly excited when a physiotherapist reached out to do a feasibility study of using RPT to provide physiotherapy services for non-malignant lower back pain. I learned a huge amount from these couple of visits. I realized that even when I collaborate with a

physiotherapist, I rarely, if ever actually see their process. Working together refined my skills at examining lower extremities.

5.8 Challenges

I have discussed how much of a game-changer RPT could be. The potential is immense. I believe there is an overwhelming benefit to using RPT, however it is not a panacea, and there were some significant challenges related to it that should be addressed.

5.8.1 Access to the Appropriate Provider

One of the biggest challenges we faced was not always having access to the ‘right’ expert providers. The only acute care service we could access were the pediatric intensivists. This service was incredibly valuable; however, we did not always need an intensivist, and often a general pediatrician or another discipline would have been more appropriate level to consult. Some of the intensivists were much more willing to be called for anything, even general clinic stuff, but not all of them were receptive to this, which I appreciate and respect. The addition of dermatology, and occasionally some other ad hoc specialists, and of course the chronic kids’ clinics made a difference, but these were only for scheduled clinics which were few and far between.

The services we could access were fantastic, but knowing how beneficial RPT could be, it was frustrating not having access to more services when we needed them. There were many specialties that we wanted. Internal medicine, psychiatry, and general pediatrics would have been valuable to access.

There were many occasions when we needed some expertise beyond what we had at the clinic, and sometimes I needed to be a pest to get advice from the only source we had (the

pediatric intensivists). Just because something is not an emergency does not mean it does not warrant prompt attention, and that really was not otherwise available.

I remember being at my wits end trying to manage a child with persistent infected eczema covering his entire face and scalp – the most severe case that I had seen. The child had recently been on countless courses of antibiotics and steroids, and the infection just returned as soon as the treatment was completed. What we were doing was not working. This child was not acutely unwell, vitally he was quite stable, albeit uncomfortable. It would have been extremely disruptive to send the child out, as mom had another high-needs newborn on oxygen plus four other children at home. I needed someone to lay eyes on the child and give advice on what would be an optimal and safe treatment. I did not need an intensivist, but I needed some help, and that is all we had access to. This was before we connected with the dermatologist.

On the flip side, while we were being discouraged from using the robot for non-critical or emergent cases by some of the specialists, we were also getting pressured to use the robot more. We did not always require using the robot for consultations. We were quite capable and competent to provide most of the care independently. Even more so because of the mentorship we had gained from using the robot for previous cases.

I may have a heightened sensitivity to the notion that there should be more remote acute care services available, probably in part because I am from resource-dense Toronto and have a particular interest in access to care. I often found myself reflecting that if the same patient had presented to an emergency department in Toronto, or Saskatoon for that matter, the physician would have requested a consultation with a specialist. It was sobering to recognize that in health centers such as ours, which had a dearth of resources, we were not able to access support for our patients when needed, even though we had an effective tool that would make it so easy.

We would have been happy to have pretty much any specialty available for clinics. Given the disease burden in our population, I think there would have been justification to have clinics or even just intermittent scheduled visits with psychiatry, general pediatrics, nephrology, vascular, obstetrics (in particular, the gestational diabetes program), and wound care. I often thought that if we were connected to the specialist already with scheduled RPT visits, then if they happened to be on-call when we required a consult through ACAL, they might be willing to connect. I remember an instance when I was consulting with a nephrologist about one of their patients who was in renal failure and presented to the clinic with significant edema. I kept thinking how much easier it would have been if he could just pop on the robot and see the patient for himself. This was a case where the remote consult would have likely been faster than trying to do it over the phone.

5.8.2 Local Providers

It is important to have the right level of provider to consult with, likewise it is important to use the local providers appropriately. In most of the encounters, I felt like I was an active participant, and was acting within the NP role. However, there were some encounters that I found myself functioning in more of a technician role. If we were well staffed and I had time, I would happily participate in any remote encounter, however if we were busy, it may not have been the most optimal use of my time. Other people could be engaged to help, such as an LPN, or a home care aide for instance. In some situations, it may be reasonable to use a lay member trained to assist with the encounters. One possible option is a hybrid model, when the NP can join at the beginning and the end of the appointment, so they can review the history and concerns, and then at the end to develop the treatment plan.

I think it is important to recognize that with the use of RPT to manage more of the care for patients in the community that the burden of care is placed on the nurse's shoulders. Nurses, as a valuable resource, need protection from overwhelming situations that can drive nurses to burnout. Job demands and increased workload can affect job satisfaction, increased stress, and lead to burnout (Penz et al., 2018).

Nursing stations are typically not open 24/7 like most hospitals are, and do not have any in-patient beds. Our clinic was open Monday to Friday from 0830 – 1700. Outside of those hours, nurses are on-call for emergencies only, with one nurse designated to be 'first' and another as their 'second' on-call. This community had a particularly heavy on-call burden, in part because of the size of the population.

When patients are seen using RPT, these consultations often take much longer than they would on the phone, and sometimes the care involves monitoring a patient for several hours. Take the case of a young child who had croup and scored borderline moderate to severe. Often, we send these children to hospital if there is concern about their oxygen saturation. I called Dr. Holt given the severity. The family brought this kid in around 1 am, which is not an unusual time for these cases to present as the barking cough and stridor often become worse at nighttime. We initiated standard treatment: nebulized epinephrine and dexamethasone. The nebulized epinephrine is very effective at reducing the symptoms quickly, but only lasts for a couple of hours. The dexamethasone provides longer-term support, but it takes a few hours to take effect. There is a risk of rebound symptoms that can be worse than the original presenting condition in that 'window' after the nebulized epinephrine wears off but before the dexamethasone takes full effect. As a result, we needed to monitor this child for about four hours to ensure he did not have a rebound and that his oxygen levels remained stable before he could be sent home safely.

Here is the conundrum. Given his severity, I could have initiated this treatment anyway, and sent him to Flin Flon for oxygen support, monitoring and potentially an admission. The nebulized epinephrine would have taken full effect during the ambulance ride, meaning by the time they arrive in Flin Flon he would present totally fine and they would discharge him, likely before the window period was over. This is obviously not ideal for the patient or his mom. The ambulance would have been out of the community for four hours, so also not a great use of resources. However, I probably would have only been at the clinic for a maximum of one-hour, and then gone back home to sleep. Keeping him at the clinic to monitor his condition was much better for the patient, and it was beneficial to the system, however, it meant I was at the clinic for closer to five hours. I got home around 6:00 am and had to be back at the clinic for work at 8:30 am. Unlike most physicians who work in northern hospitals, we do not get a post-call day off.

I give this example not as a complaint, but rather to explicate the reality of the time burden that using RPT can have for nurses. Better patient care should be the first priority. Preventing hospital transfers is great for the system, and easier for the family, but the benefits often come at the expense of the nurses. Say this had been my second night on call, and the previous night had been busy with a trauma and I had to go with a patient in the ambulance to the hospital. It is very possible that I would have worked all day at the clinic, been up most of the night on call, then worked all day at the clinic, then be up all night monitoring this child, and then would have to be back at work the next morning. This is not a far-fetched scenario. At what point is it reasonable to say no, we are sending him out, I must sleep to function tomorrow so I can take care of all the other patients who need to be seen? Patient safety is of paramount importance but sometimes there needs to be a balance between doing extra for one at the expense of many others getting care.

Of note, this issue was not only limited to on-call hours. Keeping a patient during the day could also be a challenge as it would usually tie up either a clinic room or an emergency bed, not to mention a nurse. This was particularly challenging for patients who may need to go to the hospital, but the care team decided to have the patient monitored at the clinic for a period of time, and then decide whether or not to transfer. When it was busy and we were short-staffed, this could be detrimental to seeing other people. Sometimes the decision would be made right at the end of the day, when making arrangements can be more difficult, and often required a nurse to stay late, sometimes for several hours. The clinic is not set up for inpatient care. More often than not it was manageable, but sometimes keeping a patient during the day could be quite problematic.

Another reality is in the event the child was to deteriorate, we still hold ultimate responsibility for their care. Even though we have the specialist supporting us, we may not have the necessary skills or equipment to manage the care, and help would still be hours away. I have heard from colleagues and other local providers in different communities about some discomfort they have about being asked to manage the care of a patient that they feel is beyond their comfort level. This model of care does make possible for local providers to be able to manage more complex care with the expert support of the specialists, however I think that the final decision whether to keep a patient in the community or to transfer out must be deferred to the local provider. If the local providers are not comfortable keeping the patient on-site, then they should not be pressured to do so.

5.8.3 Inflexible Policies

The example I gave of the child with croup was a real case. I was at the clinic all night. I had been up the whole night before. And I had been at work the full day three days in a row. I

was exhausted and beginning to feel impaired by the third day. I think a very reasonable solution would be to allow nurses who are up most of the night on-call to be able to take a few hours in the morning so they can get some sleep. Mornings are typically less busy at the clinic, and there are usually enough people around to provide coverage. The value of sleep should not be underestimated, and even getting one or two extra hours of sleep can make a huge difference. The policy was that nurses were expected to begin work at 0830 regardless of if they had been on call the night before. If a nurse had been up all night with call, and requested time to sleep, it may be permitted at the discretion of the nurse in charge, however that time would be taken as vacation time or unpaid leave.

So, now we were in the situation where we were trying to improve the quality of care for the patients by using the robot and providing more of the care on-site. The inflexible policy did not support the change in process and function. It seemed that it was viewed as no problem for nurses to work around the clock, without much sleep, and in fact it was expected of us. We were expected us to change how we worked, including increasing our workload and responsibility, yet there was no flexibility in the policies to accommodate this change.

5.9 Conclusion

It is obvious that there are significantly positive aspects that having expert support using RPT can bring to NP practice. For me, this was especially valuable as I was transitioning from expert RN to novice NP, particularly with respect to my confidence and competence. But there are some real challenges as well. The nurses need to have a voice that is listened to and respected and should have a leading role in developing new initiatives at the clinic.

CHAPTER VI: CONCLUSIONS AND RECOMMENDATIONS

With this thesis, I have sought to gain a deeper understanding about how Remote Presence Technology (RPT) has disrupted the way that health care services are delivered, and the effect it has on nurse practitioner practice. Having this knowledge is one thing but doing something with the information is the next step. In this chapter, I will discuss the implementation of disruptive innovations, implications for practice, and provide some practical recommendations.

6.1 As Simple as Solving a Rubik's Cube

The approach to implementing disruptive innovation is a lot like solving a Rubik's Cube. I think the frustration of trying to solve a Rubik's Cube is almost a universal experience (see Figure 6.1). Many people approach the Rubik's Cube by attempting to solve one face at a time, often without consideration of the adjacent faces or the system overall (see Figure 6.2). The faces cannot be solved in isolation from the others. It is virtually impossible to solve the puzzle with this approach. Likewise, attempting to implement disruptive innovation into practice by focusing only on one side of the system without any regard to other components will not result in a meaningful change.

Figure 6.1 Scrambled Rubik's Cube



Figure 2 One Face Solved Incorrect



Figure 6.3 One Face Solved Correct



To solve a Rubik's Cube, you first must understand how the system works. The centre pieces are fixed. They can twirl around, but otherwise do not change position. The centre pieces, therefore, determine the colour of the face, generally with white opposite yellow, orange opposite red, and blue opposite green. Knowing this, you can use the centre pieces as anchors as you work to solve the first face, ensuring the edges match the colour of the adjacent face (see Figure 6.3).

Now, with this first face solved properly, it can act as a foundation from which to work on solving the rest of the puzzle, next solving the middle layer (see Figure 6.4), before tackling the final layer (see Figure 6.5). Anytime you move one piece, effectively you are moving many other pieces into different positions. It is impossible to move a single piece in isolation without having an impact on the rest of the puzzle, unless of course, you pull off all the stickers and attempt to glue them back on. I assure you that will irrevocably ruin the Rubik's Cube.

Figure 6.4 Two Layers Complete



Figure 6.5 Solved Rubik's Cube



To apply the Rubik's Cube analogy for the case of implementing RPT in remote communities, it is essential to understand the system in which the clinics function. The overall "puzzle" to be solved is access to health care services. This would be akin to solving the final face of the Rubik's Cube, but there are many steps and components to consider before that can be achieved.

The first face to start with might be deploying the robot to the clinic. There needs to be an internet connection with adequate bandwidth. Staff need training on how to use it. Just having the device, internet connection, and knowing how to use it does not do very much to solve the issue of access to care. There must be relevant specialists who will connect and provide consultations. The clinic needs to have appropriate resources, including medications, equipment, tools, and the set-up, to be able to manage the care on-site. Nurses must be on board with the new model of care. Policies need to be adjusted to support the nurses as the way they are expected to work changes. Patients and families must be willing to receive care using the technology. The technology itself does not solve the problem in its entirety, but it can act as a catalyst for innovating the whole model of care, resulting in a cascade of changes, some large, some small, that can result in a meaningful outcome.

6.2 Recommendations - Diffusing Remote Presence

Omachonu and Einspruch (2010) identify seven critical success factors for successful dissemination of innovation in health care. The first involves having “formal mechanisms to find sound innovations that should be disseminated” (p. 15). The Remote Presence Robotics Program at the University of Saskatchewan, of which I am currently the clinical coordinator, largely functions in this capacity. Part of our mandate is to test out new innovations and determine if they can be used in the province. Because of the reputation of our program, and more specifically, the director’s reputation, companies across Canada and beyond often send us their new products to test out. We evaluate factors such as the cost and quality of the product, the functions and usability on both ends, and the limitations of the technology. We consider what settings the technology could be useful in, whether there are different applications that it could

be used for, how it compares to other platforms currently being used. We consider the innovations at the macro, the meso, and the micro levels.

My personal belief is that innovations should be matched to the needs and the context of the setting and must have a practical application (needs driven). I favour devices that offer the most applications, as well as both the flexibility and adaptability at the expert side and the patient side. It also must be intuitive to use and very user-friendly.

The next two factors involve investing in early adopters and making the activity observable (Omachonu & Einspruch, 2010). This can be looked at in two ways. First, it is important to promote and support the providers on the ground who are innovating a process or new model of care. This is important for the local providers as much as for the expert providers. It should also be looked at more broadly, beyond the individuals but at a systems or programs level. The external attention can foster more motivation to keep going. You need the early adopters to have enough support and visibility to help guide their teams through the transition successfully, while giving broader visibility to the whole initiative can have more of a sustainable impact.

Trusting and enabling reinvention is essential for the success of the diffusion of the innovation. The intention of disruptive innovation is to upset the status quo to make a radical change. Once the innovation has been implemented, it is natural that existing structures and system will need to be adjusted to accommodate the change. Going back to the Rubik's Cube analogy, this is the part after completing the first face and row (the initial disruptive innovation), and now we build on that foundation and work on the middle layer and the top layer. This does not happen immediately or simultaneously with the initial change, but rather in response to the change.

Omachonu and Einspruch (2010) also identified the need to create slack (including resources) for change. I think this is one of the most critical aspects for the facilitation of change. This was one of the pressure-points we experienced in the community. The way we worked had changed, but the policies were rigid. By changing how care is provided, the use of resources changed. I think it is important to reinvest a portion of the saving at the systems level back into the community. This is exceedingly difficult in our system, as the funding comes from the proverbial *different pots*.

Finally, Omachonu and Einspruch (2010) recommended leading by example. This is the kind of leadership that will influence the success of the innovation. Champion users at the ground level should have a voice that is respected and listened to by the senior leadership who are removed from the day-to-day functions. Responsive, radical, and adaptive leadership styles are particularly useful at this stage and are better suited than a strictly technical leadership style. The leadership needs to allow flexibility. Disruptive innovations blow up the status quo, attempting to maintain the status quo aside from one small area will not result in reform. For the change to have the most meaningful impact, it needs to be driven much more at the grassroots level. For this to be successful, there needs to be some discretionary authority to make changes on the ground. Trust the local innovators. This does not mean there is no accountability, but they need a wide berth. Parameters can be established, but micromanagement from afar will not work.

At this stage, I personally like the Plan Do Study Act (PDSA) cycle approach. The PDSA cycle is a process of trialing incremental changes in a rapid, but structured manner (HQO, n.d.) Not all the changes are disruptive, nor should they be, and too much can result in change fatigue. After the major change, smaller, incremental changes could help shift the pieces into place and building and refining supports for it. These changes can be made on the ground without requiring

extensive planning. Staff are empowered to identify issues or challenges that they face and can make a change on a trial basis to see if it has an effect. These changes tend to be lower stakes and are at the grassroots level.

6.3 Implications for Practice – Practically Speaking

Drawing from my experience there are several specific points that could have made for a better implementation of this technology. First, it is useful to consider the catalyst for the change. Are needs chasing the innovation, or is the innovation driving the needs? I think in this case, there are elements of both. The need for improving access to care has always been there, which influenced the innovation of using RPT in the first place, however now that the innovation is in place, the potential of the functions and uses are driving the needs, finding new ways to use it. Before the robot came, a needs assessment was done with the community, and it was determined that this technology could serve the needs of the community. However, the technology itself is just a tool. The needs assessment revealed the need was for providers services through the robot, not for the actual robot itself. Pediatrics was a high need area, but it would have been helpful to have ongoing needs assessments occurring, and more services available. The robot should be reserved to be used when it is needed, and not just for the sake of using it, which can become a “make-work project”, or develop a reliance on it.

Allowing the nurses some discretionary authority, specifically with processes and policies, would help with buy-in and morale. Obviously, there should be limits, but reasonable requests should not be rejected without a rational explanation. The example of the policy about sleeping after being up all night on call could certainly have a reasonable compromise.

Building buy-in from the providers at the local level and the specialists can be challenging, and it is difficult to paint every encounter with the same brush. Instead, it is helpful

to understand the different types of encounters, what the purpose of the consultation is, and what barriers might occur (see Appendix A). By categorizing the types of encounters loosely by CTAS scores, we can consider how the intention of the consultation changes. Likewise, the potential barriers to the consultations, as well as possible strategies will change depending on the type of encounter.

A CTAS Level I is a resuscitation, and is very much a life-or-death situation, and will be all-hands on deck at the local site. A specialist could support the team by running the code. For this to be helpful, the remote presence device should require as little assistance from a nurse as possible. Even the process of calling ACAL to request specialist support can be far too time consuming. Typically, any call to ACAL involves a few minutes of answering questions, with the dispatcher verifying who you are, the patient's demographic details, summary of the condition, confirming the call back number, etc. During a code, there is no time to answer those questions. If we need help, we need it *now*. If someone at the clinic could call ACAL and just tell Dispatch "*Remote-Code Blue [Community Name]*" or "*Remote-Code Pink [Community Name]*", that could be the equivalent of pushing the code button by a hospital bed. Many teams can run good codes on their own, and it may not be necessary to have the remote consult during the actual resuscitation but could be more helpful immediately after a successful code is done, and the patient needs to be stabilized for transfer.

With a patient who is a CTAS Level II, it can also be critical to get rapid assistance. The goal of the encounter is not necessarily to prevent a transfer, but more likely to stabilize the patient before transporting. Potential barriers could include resistance from nursing or medical staff to have a consultation and push back against changing the practice of 'load and go'. It may be helpful to set the use of remote presence as a standard of care and refusing to use it could be

seen as an ethical issue, however I am hesitant to suggest mandating it, as there are so many different factors that can be at play.

The purpose of a consultation for a CTAS Level III is really to provide support for decision making for the local providers, as well as to stabilize the patient in the community, and possibly prevent a transfer. In many ways, the less critical the patient's condition is, the more likely that the burden of care will be on the remote sites. The acuity of patient's condition can vary considerably at this level, and the specialists might not consider these cases as appropriate as the higher acuity patients. Specialists should be aware and non-judgmental when local providers reach out asking for help or acknowledge that they cannot manage something on their own, or do not feel comfortable doing it.

Urgent care services must be available around the clock, or they will not be accessed. If specialists are not able to provide 24/7 access, then the services can be promoted as non-urgent/scheduled appointments or set consistent hours that the service is available. This will be particularly appropriate for CTAS Level IVs and Vs. These patients have acute concerns but do not necessarily require immediate attention.

It does not work if the availability of the access to specialist support is inconsistent or unreliable. If local providers seeking help are told 'no', they will not continue to ask. Having access to the relevant disciplines is essential, but empty promises for services that do not pan out builds up expectation, and the let-down builds frustration.

It is also helpful to establish guidelines for what specialists are willing to be contacted. If the local providers contact a specialist for urgent support, however, the specialist does not feel it is an appropriate case, I think it would be prudent to provide the support in the moment, and then later discuss the appropriateness of the consult request with the local provider. It takes a lot to

reach out for help, and if local providers are asking for help, give it to them if possible, and do not admonish them, especially in front of a patient.

6.4 Limitations

The nature of this research being an autoethnography means that it is provided almost exclusively through my own lens and world view, and within the context of the one clinic that I worked at, thus there is an intrinsic bias. To enhance the validity and credibility of the research, I created and followed a transparent research process. I also had two former colleagues read my manuscript for their perspectives. They provided really valuable feedback, and both mentioned separately that they had an emotional reaction to reading it. Some of their comments included:

- “you did a fantastic job at describing, acknowledging, identifying your personal & professional evolution with RPT”.
- “It really gave me anxiety reading your description of the various patient scenarios, challenges, ***** issues, etc... it brought it all back to me. That speaks of how genuinely written your thesis is”.
- “You did an excellent job at conveying the barriers of the “old” system and benefits of RPT so that patient’s care getting appropriate care by the appropriate provide in the most appropriate environment (whether that be at home, or at the most appropriate facility).
- “I liked the comparisons you made to Telehealth. As nice as Telehealth may be for the patient (don’t have to travel etc), you were able to convey that it’s not the best for the provider or continuity of care. So true!”
- “I remember every example and its (sic) all brings me right back.”
- “There is no concern that what you wrote is inaccurate. So no worries there.”

- “And your experience as a student is unbelievable (but sooo (sic) accurate of *****! The reader will be shocked.”
- “I loved the ‘Blueberry Blue’ and you laid it out so well to validate the need for better care.”
- “I’m loving it actually – made me tear up a bit and miss the place.”
- “Your analogy of the complexities of introducing a new technology-healthcare delivery model to the Rubix (sic) cube is ingenious really.”

There is also the reality that as this research was very specific to my experience in one community, there can be a question as to how applicable my findings are beyond this specific experience. In the position that I have held for the last three year as the clinical coordinator for the Remote Presence Robotics Program, I have had the benefit of visiting providers in every community that has an RPT device. I believe that many of the challenges I faced and experiences I had are consistent with other northern remote communities. That said, this would be a great area for future research.

6.5 Future Research

I think this research functions as a good starting point, introducing into the literature lived experience as a NP working in a remote community, using RPT. I would like to see future research expand on this work and continue to explore the effect the RPT model of care has on the care patients receive and the effect on the healthcare system. I think exploring the experiences of patients, nurses, NPs, remote physicians, and the expert providers will be an important avenue to continue. Another area of research should include a more in-depth look at what policies are effective to support implementing innovation in healthcare service delivery. Finally, I believe that we should look at RPT as one tool in the ever-expanding field of virtual care platforms, and

further research should focus on continuing to develop and establish different models of providing virtual care to best provide remote communities improved access to care and support the local providers.

6.6 Conclusion

The conceptual framework I used for this thesis is multi-faceted and provided me with some structure to take a 360-degree look at RPT as an innovation in the health care delivery system. RPT is a disruptive innovation that creates a new model of health care service delivery. Disruptive, or radical, innovations have the potential to make dramatic improvements to systems.

I believe it is essential to understand “what” you are trying to revolutionize, and more importantly “why”. The overarching system being addressed is access to health care services in remote communities, with the goal of improving access to care. In Chapter II, I reviewed the disparities of access to healthcare services in Saskatchewan to better understand the scope of the problem, the contributing factors, and the consequences of the inadequacy of the services in rural and remote communities. Ultimately, the intention of RPT is to mitigate the barriers to care, and can serve multiple purposes, including treatment and diagnosis, prevention, and education, research, and outreach.

The authors of the conceptual framework place particular emphasis on the needs of the patients and healthcare professionals who deliver the care. Chapter IV focuses on how the patient is seen, how the patient is heard, and how the patients’ needs are met. I also addressed how the factors such as quality, costs, safety, efficiency, and outcomes were optimized using RPT. In Chapter V, I discussed how the use of RPT affected the local healthcare providers own practice and how it changed the way we delivered healthcare services. Finally, Chapter VI I review the implications on practice and provide practical strategies and recommendations for disseminating

RPT and other healthcare innovations in rural and remote communities. This is just the first step in establishing my own lived experience in the literature, but there are many opportunities to further expand on this research beyond this autoethnography.

APPENDIX A: TYPE OF ENCOUNTERS, POTENTIAL BARRIERS, AND POSSIBLE STRATEGIES

Types of Encounter	Providers Involved	Intention of Encounter	Potential Barriers	Possible Strategies
CTAS 1 – Resuscitation	Physician – if present Nurse	<ul style="list-style-type: none"> • Specialist could run code (or support local provider who is running the code) • Increase chance of survival • Using RP7i means specialist is autonomous, does not require assistance from a team member 	<ul style="list-style-type: none"> • Physician reluctance • Preference to run code themselves, then consult • Over-confidence in abilities • Unconfident in skills; risk of being ‘exposed’ or perceived to be incompetent • Time calling ACAL during code can take a team member away; need all hands-on deck 	<ul style="list-style-type: none"> • Educate local providers on clinical benefit of having specialist run code. • Make it standard of care • Refusal to use robot could become ethical issue • Calls to ACAL automatically go to RPT specialist to deploy robot • Make calls as short and easy as possible • Only have to say “tele-code ‘colour’, <i>community name</i>”, not have to give any further details (including patient name/your name). • Allow anyone to make that call (could be paramedic or RCMP or a lay-staff person) • Service must be available 24/7

Types of Encounter	Providers Involved	Intention of Encounter	Potential Barriers	Possible Strategies
CTAS 2 – Emergent	Physician – if present Nurses	<ul style="list-style-type: none"> • Early goal-directed therapy • Stabilize patient for transport • Likely not intending to prevent transport 	<ul style="list-style-type: none"> • Physician/Nurse reluctance • “Load and go” mentality • If something is a “load and go”, using RPT could delay care • Unconfident to manage critical patient • May not have some advanced skills (i.e., intubation) • Possibly does not have appropriate resources (meds, equipment, lab, etc). 	<ul style="list-style-type: none"> • Educate local providers on clinical necessity of early goal-directed therapy. • Identify conditions for which “load and go” is appropriate • Make it standard of care • Refusal to use robot could become ethical issue • Calls to ACAL automatically go to RPT specialist to use robot • Service must be available 24/7 • Specialist training on tele-communication; awareness of potential vulnerabilities of the remote provider; be non-judgmental • Specialist to listen to local providers regarding logistics and other considerations • Advocate for appropriate resources

Types of Encounter	Providers Involved	Intention of Encounter	Potential Barriers	Possible Strategies
CTAS 3 – Urgent	Nurse or physician	<ul style="list-style-type: none"> • Stabilize patient in community • Possibly prevent transport • Regionalize as appropriate 	<ul style="list-style-type: none"> • Burden of care placed on remote site • RPT can take more time • Local capacity/staffing • Hospital versus clinic (i.e., are there beds available) • May not have appropriate resources (meds, equipment, lab, etc.) 	<ul style="list-style-type: none"> • Redirect a portion of the cost savings back into the community to increase local capacity • Identify local site deficits and advocate for them - access to U/S; CT; lab, etc. • Incentivize local providers to utilize RPT • Identify local champions • Promote the value of RPT has on patients and for the local provider • Specialist training on tele-communication; awareness of potential vulnerabilities of the remote providers and be supportive • Specialist to listen to local providers regarding logistics and other considerations • Specialists to be aware and non-judgmental when local providers reach out asking for help or acknowledge that they cannot manage something there (or don't feel comfortable doing it). • Service should be available 24/7

Types of Encounter	Providers Involved	Intention of Encounter	Potential Barriers	Possible Strategies
CTAS 4 – Less Urgent	Nurse	<ul style="list-style-type: none"> • Consultant role • Help with diagnosis and/or treatment/management plan. • Likely not to transport; potential to defer transport or may do lower level of transport 	<ul style="list-style-type: none"> • Specialist frustration if perceived to be inappropriate • Burden of care placed on remote site • Local capacity/staffing • Hospital versus clinic (i.e., are there beds available) • May not have appropriate resources (meds, equipment, lab, etc.) • May not have appropriate resources (meds, equipment, lab, etc.) 	<ul style="list-style-type: none"> • Incentivize local providers to utilize RPT • Identify local champions • Promote the value of RPT has on patients and for the local provider • Consider having different levels of providers available for this (utilize NPs, etc.) • Specialist to listen to local providers regarding logistics and other considerations • Specialists to be aware and non-judgmental when local providers reach out asking for help or acknowledge that they cannot manage something there (or don't feel comfortable doing it). • Service should be available 24/7
CTAS 5 – Non-urgent	Nurse	<ul style="list-style-type: none"> • Consultant role • Help with diagnosis and/or treatment/management plan. • Mentorship • Likely not to transport; potential to defer transport or may do lower level of transport 	<ul style="list-style-type: none"> • Specialist frustration if perceived to be inappropriate • Burden of care placed on remote site • Local capacity/staffing • Hospital versus clinic (i.e., are there beds available) • May not have appropriate resources (meds, equipment, lab) • May not have appropriate resources (meds, equipment, lab) 	<ul style="list-style-type: none"> • Provide education on when it is appropriate to use it (i.e., time of day) • Consider having different levels of providers available for this (utilize NPs, etc.) • Incentivize local providers to utilize RPT • Identify local champions • Promote the value of RPT has on patients and for the local provider • Specialist to listen to local providers regarding logistics and other considerations • Specialists to be aware and non-judgmental when local providers reach out asking for help or acknowledge that they cannot manage something there • Set hours for availability

Types of Encounter	Providers Involved	Intention of Encounter	Potential Barriers	Possible Strategies
Chronic Care	Nurse or technician	<ul style="list-style-type: none"> • Improve access to care in patient's community • Reduce burden of transport for patient (or specialist) • Possibly decrease no-show rates 	<ul style="list-style-type: none"> • Local capacity/staffing • Burden of time • Can take longer • Potential for no-shows 	<ul style="list-style-type: none"> • Train local people to be RPT technicians, use nurses when required • Incentivize local sites • Reinvest some savings for local support for the clinics (dedicated van/driver/childcare/etc.)
Allied Health	Nurse or technician	<ul style="list-style-type: none"> • Improve access to care in patient's community • Expand services • Reduce burden of transport for patient (or specialist) • Possibly decrease no-show rates 	<ul style="list-style-type: none"> • Local capacity/staffing • Burden of time • Can take longer • Potential for no-shows 	<ul style="list-style-type: none"> • Train local people to be RPT technicians, use nurses when required • Incentivize local sites • Reinvest some savings for local support for the clinics (dedicated van/driver/childcare/etc.)

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