CAN NURSE PRACTITIONERS DELIVER EFFECTIVE AND EFFICIENT TELEMEDICINE-BASED CARE FOR PREGNANT WOMEN WITH OPIOID USE DISORDER LIVING IN NORTHERN BC?

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Abstract

Opioid use disorder in pregnancy has escalated perilously in BC in recent years, corresponding to the epidemic observed in the general population. Although evidence-informed treatments exist, many pregnant women are unable to access life-saving treatment due in part to their rural or remote location. Advances in telemedicine (TM), in particular videoconferencingbased technology innovations, are postulated as one way to improve rural residents' access to primary care services. Presently, little is known about the effectiveness and efficiency of providing opioid agonist treatment via distal technologies for pregnant women living in northern BC. Therefore, an integrative literature review has been conducted to answer the following research question: Can nurse practitioners deliver effective and efficient TM-based care for pregnant women with opioid use disorder living in northern BC?

Findings of this review suggest there is currently not enough quality evidence to determine whether TM can meet the needs of rural pregnant women in BC with opioid use disorder and to what extent TM could provide effective and efficient care in a rural context. In fact, evidence suggests that health care providers and researchers need to step back from current TM approaches and return to the developmental phase of designing, implementing, and evaluating health care service delivery via TM. Recommendations and strategies for TM implementation at the policy, organizational, and patient levels for primary care providers are discussed.

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Chapter One

Introduction

Canada is in the midst of an opioid use epidemic involving both licit and illicit forms of the potent narcotics. Canada ranks with the United States as having the highest opioid consumption in the world (International Narcotic Control Board, 2015). Opioid use in pregnancy is associated with an increased risk of adverse outcomes for both mother and fetus. Research suggests that untreated opioid use disorder during pregnancy is associated with a lack of prenatal care, increased risk of placental abruption, preterm labor, maternal obstetrical complications, neonatal abstinence syndrome (NAS), and fetal death (Schempf & Strobino, 2008; SOGC, 2017c). Additionally, untreated opioid use disorder is associated with engagement in high-risk activities such as sex trade work which exposes women to STIs, blood-borne pathogens, violence, and legal consequences (American College of Obstetricians and Gynecologists, 2017). The medical and legal consequences associated with opioid use disorder can lead to disruptions in social support and may add to stigmatization of pregnant women. Therefore, it is imperative to advocate for this vulnerable group, particularly in regards to improving access to treatment. Pregnancy provides an important opportunity to identify and treat women with substance use disorders (SOGC, 2017c); therefore, all primary care providers need to take an active role in the management of opioid use disorder in pregnancy. Strategies to help alleviate the devastating outcomes related to this epidemic are keenly sought and include access to treatments based on high quality evidence.

The standard treatment for opioid use in pregnancy is methadone or buprenorphine agonist treatment (British Columbia Center on Substance Use [BCCSU], 2017; Jumah, 2016; Jumah, Graves, & Kahan, 2015; SOGC, 2017c). Exposure to either of these treatment medications in utero can result in NAS; however, using these treatments among pregnant women with opioid use disorder improves outcomes for both mother and fetus compared with those who receive no treatment (Jones et al., 2008; Jumah et al., 2015; Winklbaur et al., 2008). Maintenance therapy with methadone or buprenorphine provides a steady concentration of opioids in the pregnant woman's blood, preventing the fetus from repeatedly experiencing cycles of opioid toxicity and withdrawal, which contribute to the known harms and poor fetal outcomes associated with OUD in pregnancy (Finnegan, 2013).

Despite evidence and guidelines (BCCSU, 2017) supporting methadone and buprenorphine treatment for pregnant women with OUD, rural populations experience considerable difficulties accessing such services to initiate or maintain therapy. The following vignette illustrates the importance of accessible treatment for opioid use disorder in pregnancy and was adapted from Finnegan (2013):

At age 13, Arlene started using heroin. Now, 32 and living in northern BC, she continues her habit on a daily basis. Health care services are offered by multiple providers that provide care once a month on a fly-in bases in the reserve community where Arlene lives. With a population of only 500 people, and situated 600 km from the nearest tertiary center, Arlene does not have immediate access to treatment for opioid use disorder. After a series of miscarriages and elective abortions, she becomes pregnant. This time she decides to keep the baby because she cares about the father, Derek. While Derek also uses substances, he too wants to have the baby. Five months into her pregnancy, Arlene considered seeing a doctor but she was afraid her baby would be apprehended because she had not stopped using heroin. She also thought about quitting or cutting down but did not know who to ask for help. She remembered her cousin recently had her baby apprehended at the hospital due to prenatal substance use; therefore,

Arlene and Derek decided not to access care. At seven months, Arlene went into labor and was transported to a tertiary center where she delivered Annie, a preterm baby weighing just 1,500 grams (a little over three pounds). Annie had difficulty breathing and very low calcium and sugar levels in her blood. Within the first day of life, she had seizures, which the doctors attributed to a brain hemorrhage resulting from preterm birth. Because of Arlene's recurrent heroin use, which was inconsistent in both frequency and dose, her fetus had likely experienced equally recurrent episodes of abstinence (deprivation of drugs) and overdose. Baby Annie was very sick and needed treatment in the neonatal intensive care unit (NICU). While Arlene and Derek came occasionally to the nursery to see Annie, they were usually high and disruptive; on several occasions they had to be escorted out by security. Both Arlene and Derek were away from family and supports during this time. After three months in hospital, Annie recovered. Arlene said she loved Annie, however her heroin use continued untreated. As a result, Annie was placed in a foster home for medically disabled children. Her prognosis for normal growth and development is poor. Subsequently, Arlene and Derek returned to their northern community without Annie and without treatment.

The rationale for opioid agonist treatment during pregnancy is multifold. The medical, social, and legal consequences that accompany this vulnerable population are devastating. For Arlene, Derek, and Annie lack of treatment led to a lack of prenatal care, preterm delivery, poor fetal outcome, and child apprehension. This situation might have turned out differently if the standard treatment for opioid use disorder in pregnancy was accessible to Arlene in her rural home community.

In a recent Canadian systematic review, accessibility and availability were identified as the most significant barriers to receiving treatment among rural pregnant women with opioid use disorder (Jumah, 2016). The Canada Health Act promotes accessible care for all citizens regardless of gender, race, or place of residence, through the publicly funded Canadian health care system. This includes considering the specific needs of vulnerable populations in northern BC such as pregnant women with OUD (BC Charter, 2007).

Telemedicine (TM) applications represent one strategy for potentially addressing many of the key challenges to providing treatment for rural pregnant women in northern BC. In obstetrics, TM has been used to report ultrasounds, counsel patients, and provide prenatal consultations (Abrans & Geier, 2006; Rashiah et al., 2006; Vinals, Mandujano, Vargas, & Giuliano, 2005); interpret non-stress tests (Hod & Kerner, 2003; Kerner et al., 2004); and manage gestational diabetes (Dalfra, Nicolucci, Lapolla, & TISG, 2009; Homko et al., 2012). Despite the documented increased access that TM promotes as underpinned in these studies, no research has been conducted that unites TM, OUD, and rural pregnant women to address how primary care providers can incorporate TM into clinical practice for this patient population. Given that primary care is often the first entry point for maternity care as well as substance use disorders in northern BC, it is imperative that primary care providers have an evidence-informed approach to addressing accessibility of such services for their patients.

The rationale for this review is that despite pregnant women with opioid use disorder being a promising priority population in northern BC to benefit from TM, to date the issue of how this might occur has not been formally examined. As such, this integrated literature review seeks to answer the following question: Can nurse practitioners deliver effective¹ and efficient² TM-based care for pregnant women with opioid use disorder living in northern BC?

To begin, background information highlighting the significance of pregnant women with opioid use disorder living in northern BC will be presented. To provide further context, an indepth description of TM applications will be outlined. Given the focus of this paper is family nurse practitioner (NP) practice, the role and scope of practice of NPs as primary care providers in BC will be identified. Next, Chapter 3 will outline the aim, design and search strategy for this review, including a Table summarizing the search process. In Chapter 4 a quality appraisal and synthesis of the relevant studies will be conducted, followed by a discussion of their significance in context of macro, meso and micro-level health care service delivery in Chapter 5. Recommendations that target policy, organizational, and patient level of health care service delivery in the context of primary care services will be identified, as well as suggestions for implementation will be offered. Finally, the limitations of this paper will be presented and areas for further research and consideration for practice will be highlighted.

¹ Effective outcomes: appropriate health care intervention; patient safety/risks; patient acceptability; clinical outcomes (NIFTE, 2003).

² Efficient outcomes: timeliness of health care intervention; reduced patient travel; and increase access to care (NIFTE, 2003)

Chapter Two

Background

Opioid Use Disorder

Opioids are a class of drugs that include the illegal drug heroin, synthetic opioids such as fentanyl, and pain relievers such as oxycodone, hydrocodone, codeine, morphine, and many others. Opioids can be injected or taken in pill form. Opioid analgesics can be misused (taken in a different way or in a larger quantity than prescribed) or taken without a prescription. Regular use of these medications, – even as prescribed by a health care provider, – can lead to dependence and when misused, opioids can lead to overdose and death. British Columbia has one of the highest opioid death rates in Canada with over 15 per 100,000 deaths reported during 2016 (Government of Canada, 2016). In part, this is due to the recent emergence of fentanyl being used to replace or dilute heroin or other illicit opioids which contributes to a significantly higher risk for overdose (BCCSU, 2017). As a result, in April 2016, the opioid crisis was declared a public health emergency by BC's health officer (BC Gov, 2016).

Current research is showing a recent shift in health care language around opioid use that highlights the stigma attached to classifying opioid use as abusive, addictive, and dependent behaviour, since these labels can infer blame. These behaviours are components of substance use disorder as highlighted in *The Diagnostic and Statistical Manual of Mental Disorders*, Fifth Edition (DSM-5) (American Psychiatric Association, 2013). The replacement of the terms opioid abuse and opioid dependence with the term opioid use disorder is in line with recognising the condition as chronic thereby including episodes of remission or exacerbation (Schuckit, 2016).

Opioid use disorder (OUD) is a pattern of opioid use characterized by tolerance, craving, inability to control use, and continued use despite adverse consequences. OUD is diagnosed by

primary care providers (physicians and nurse practitioners) and is based on specific criteria such as unsuccessful efforts to cut down or control use, as well as use resulting in social problems and a failure to fulfill obligations at work, school, or home (American Psychiatric Association, 2013). Appendix A outlines the full criteria for a diagnosis of OUD. These issues are further complicated during pregnancy because the window of opportunity for obtaining treatment during pregnancy is small (nine months) and pregnant women with OUD tend to seek prenatal care late in pregnancy or not at all (Finnegan, 2013; SOGC, 2017b). Since the focus of this paper is gender specific, the characteristics of OUD in women are explored with a more specific focus on pregnancy in the next section.

OUD in Pregnancy

Understanding the prevalence of OUD in pregnancy is a significant issue since this has direct implications for service delivery. In the U.S., the prevalence of drug use was 6.7% while during pregnancy this was 4.4% (Substance Abuse and Mental Health Services Administration, 2011). In 2012, one in six women (17%) in Canada used opioids, with approximately 5% of users reporting misuse of these drugs (0.9% of the total population) (Government of Canada, 2011). Results from the Canadian Maternity Experiences Survey (2009) indicated that approximately 7% of women reported using drugs, including opioids in the three months prior to pregnancy and 1.0% reported using drugs during pregnancy (Public Health Agency of Canada, 2009). At present, there are no published prevalence rates for opioid use among pregnant women in BC. Due to inconsistent data reporting between illicit and prescription opioid use and the stigma and fear of child apprehension associated with reporting substance use in pregnancy, actual prevalence rates are most likely higher (Finnegan, 2013; SOGC, 2017a).

In BC, women with OUD frequently have complex health and social needs involving physical and mental health issues, history of violence, trauma, chronic pain, unemployment and homelessness (Center for Addictions Research BC, 2010). Through colonization, colonialism, racism, and discrimination, Indigenous peoples in northern BC continue to experience systemic inequities that result in poorer health outcomes (Reading & Wien, 2009). These inequities greatly affect pregnant women's opportunities and ability to access, respond to, or succeed with treatment approaches for OUD during this vulnerable time.

While current prevalence rates in northern BC for pregnant Indigenous women using substances has not been made available, preliminary data for 2016 indicates the rate of overdose and death from opioids among Indigenous people far exceeded non-indigenous rates across BC: Indigenous people are five times more likely than non-Indigenous populations to experience an overdose and three times more likely to die of an overdose (First Nations Health Authority, 2017). Across BC, overdose events have disproportionately affected Indigenous women when compared to their non-Indigenous counterparts (First Nations Health Authority, 2017).

OUD in pregnancy is an issue that may disproportionately impact Indigenous women living in northern BC, however focusing solely on this population is outside the scope of this review. To make specific recommendations for this population requires an Indigenous lens from an Indigenous researcher otherwise we are at risk of reinforcing past colonial approaches that contributed to the structural inequities that exist today. Thus, this review will focus on the overall population of northern BC while recognizing the Browne, Varcoe, Ford-Gilboe, and Wathen (2015) equity-oriented approach to primary health care services (inequity-responsive care, harm reduction, trauma- and violence-informed care and culturally safe care) is one that can benefit all rural pregnant women with OUD living in northern BC. Table 1 outlines some key barriers that are known to affect access to treatment for

pregnant women with OUD and deserve consideration by those offering treatment or any

primary care to rural prenatal women with OUD.

Table 1. Barriers to Treatment for Pregnant Women with OUD.

Psychosocial factors:
Shame, stigma, guilt, lack of family support, partner with SUD, fear of losing children,
violence, trauma, culture
Systemic factors:
Lack of appropriate treatment services for pregnant women, negative attitudes of health care
providers, transportation, child care
Biological process factors:
Shelter, food, clothing, employment

Source: Center for Addictions Research (2010); Finnegan (2013); Jackson & Shannon (2012); SOGC (2017c).

In addition to treatment barriers, OUD in pregnancy presents certain health risks. The risks associated with opioid use for mother and fetus can vary depending on the type of substance being used, duration, and frequency of use. However, it can be said that untreated OUD has been associated with risk-taking behaviour leading to higher rates of blood borne pathogens such as HIV, hepatitis, and other sexually transmitted infections, as well as preterm delivery, low birth weight, and stillbirth (SOGC, 2017c; Vuvinovic et al., 2008). Neonatal abstinence syndrome (NAS), a drug withdrawal syndrome, commonly occurs after in utero exposure to opioids. In 2009-2010, 0.3% of all infants born in Canada experienced NAS (Canadian Institute of Health Information, 2012). The incidence of NAS in Ontario has increased from 0.28 cases per 1,000 births in 1992 to 4.29 cases per 1,000 births in 2011, representing a 15-fold increase (Turner et al., 2015). It can, therefore, be inferred that the increased prevalence of NAS reflects the current prevalence of GUD among pregnant women is needed.

NAS is characterised by respiratory, gastrointestinal, central nervous system, and autonomic symptoms that can lead to respiratory distress, increased muscle tone, tremors, and seizures, poor feeding, vomiting, regurgitation, diarrhea, and sweating (SOGC, 2017c). Estimates show that 55 to 94% of infants display withdrawal symptoms (Hudack & Tan, 2012; McQueen & Murphy-Oikonen, 2016; SOGC, 2017c). Often neonates affected by NAS will have longer hospital stays and need treatment with a number of different medications to manage their withdrawal symptoms. In turn, the separation of mother and infant due to the need for NAS treatment can also lead to disturbances in mother-to-infant attachment (Finnegan, 2013). Another important consideration is that any regular, daily antenatal opioid exposure (e.g. heroin or methadone) can produce NAS complications. However, studies have shown benefits to opioid treatment such as methadone during pregnancy including: increased prenatal care; longer gestation; increased birth weight; and increased rates of infants discharged home in the care of their mothers (SOGC, 2017c). For these reasons, pregnant women can often be more motivated and ready to make a change during pregnancy (SOGC, 2017c).

Handelsman, Stein, and Grella (2005) reported that the strongest predictors of treatment readiness for people with substance use disorder were in those that had individual motivating factors driving a need to seek treatment. Studies show that earlier intervention is key to minimizing the potential harms of opioid use to mother and fetus (Jumah et al., 2015; SOGC, 2017c). Evidence also suggests that longer duration of exposure in treatment is associated with increased post-treatment outcomes such as decreased opioid use and increased social productivity (Parkes & Reist, 2010). Therefore, motivation and readiness for change is a key component to the delivery of health services that optimize engagement, care, and treatment in pregnant women with OUD. In turn, it is imperative that treatment options are available to women when they are ready. TM may help to further improve accessibility for rural women, as they will not have to wait for their provider to return to the community nor will they have concerns about the comfort level of their provider with OUD treatment in pregnancy. The following section outlines treatment options for pregnant women with OUD.

Opioid Agonist Treatment in Pregnancy

A number of empirically supported treatments exist for OUD in pregnancy, such as methadone and buprenorphine (Jumah et al., 2015). Table 2 outlines current Canadian guidelines for antenatal management of OUD adapted from Jumah et al. (2015).

Table 2. Management of OUD in Pregnancy

- Methadone maintenance therapy should be started for all women with opioid dependence in pregnancy.
- If methadone is not available, maintenance therapy should be started with buprenorphine.
- If methadone and buprenorphine are not available, maintenance therapy should be start with slow-release morphine.
- If a woman is already receiving buprenorphine plus naloxone maintenance therapy before pregnancy, she may continue to do so during pregnancy or change to buprenorphine alone if available.
- Detoxification should only be used at the patient's request. The patient should be counselled about the high failure rate of detoxification, the risks of overdose with failure of detoxification and the option to start maintenance therapy at any point should she relapse.
- All pregnant women with opioid dependence should be offered maintenance therapy and rehabilitation services postpartum.
- Methadone, buprenorphine (Subutex), buprenorphine + naloxone (Suboxone) and slow-release morphine (Kadian) are all available in Canada.

Source: Adapted from: Jumah, Graves, & Kahan (2015)

The BCCSU (2017) and CRNBC (2017a) use the term "opioid agonist treatment" (OAT) to include the use of methadone and buprenorphine for maintenance treatment. Regardless of the prescribing provider, it is important to consider that OAT requires a collaborative approach in order to meet the complex needs of pregnant women. The most recent guidelines from the BCCSU (2017) and SOGC (2017c) recommend consulting the RACE³ team or an addiction specialist for OAT in pregnancy.

OAT is widely regarded as both a highly effective treatment for opioid dependence and an evidence-informed harm reduction intervention to prevent the transmission of blood-borne pathogens (Office of the Provincial Health Officer, 2014). Current evidence suggests that OAT and obstetrical care result in less overall substance use, improved prenatal care, and lower rates of obstetrical complications which results in improved outcomes for mother and fetus (SOGC, 2017c). However, the effectiveness of BC's OAT system depends on an interprofessional approach with three key components: prescribing, dispensing, and psychosocial services and supports (Office of the Provincial Health Officer, 2014).

Until recently, two professional regulatory bodies were responsible for the prescribing and dispensing components of the OAT system: College of Physicians and Surgeons of British Columbia (CPSBC) and College of Pharmacists of British Columbia (CPBC). As of February 14, 2018, a third professional regulatory body has now been approved for induction and continuation/maintenance prescribing of OAT: The College of Registered Nurses of British Columbia (CRNBC) for nurse practitioners (CRNBC, 2018). The registrants for the three regulatory bodies in BC (physicians, pharmacists, and nurse practitioners) must meet specific

³ RACE: Rapid Access to Consultative Expertise via telephone for health care professionals

training and certification requirements to be eligible to prescribe/dispense opioids for maintenance purposes.

Prescribing OAT is a gradual process requiring patients to be seen weekly to monitor treatment response.⁴ Methadone requires additional monitoring as it is initially prescribed as daily witnessed doses ingested under the supervision of a pharmacist until patients demonstrate stability⁵ (approximately 12 weeks). After stability has been determined then patients may choose to negotiate carries (or take-home doses) of OAT (BCCSU, 2017). Full coverage for methadone and buprenorphine is available to individuals covered under the following plans: B.C. Income Assistance (Plan C); Fair PharmaCare (those who do not have a deductible or family maximum); Non-Insured Health Benefits Plan; and most recently Plan G, BC PharmaCare's Psychiatric Medications Plan (BCCSU, 2017). The government of BC has taken recent action to improve access to OAT services by providing full health care coverage along with the necessary regulatory and policy changes towards prescribing privileges. TM might further help to improve access by offering new innovative ways of delivering OAT to rural communities.

Thus far, evidence has shown that OUD in pregnancy is a significant issue in BC that has detrimental medical, social, and legal consequences for mother and fetus. Evidence-informed treatment for pregnant women with OUD exists and access is improving through various policy levers (BCCSU, 2017; Jumah et al., 2015; SOGC, 2017c). For rural women, however, OAT

⁴ For safety reasons patients are monitored weekly while adjusting dose due to pharmacokinetic properties of methadone (long half-life, slow bioaccumulation) and the high degree of individual variability in absorption rates, metabolism, potency and cross-tolerance with other opioids (BCCSU, 2017).

⁵ Stability defined as: clean urine drug screens for 12 weeks; stable methadone dose for 4 weeks; social, cognitive and emotional stability; ability to safely store methadone at home; no signs of injection drug use (BCCSU, 2017).

services are often difficult to access or are non-existent. The following section will address the issues of rural access to OAT services in British Columbia (BC).

Rurality

In 2011, with a population of over 35 million, 19% or 6 million Canadians lived in rural and remote communities across the country (Statistics Canada, 2011). Likewise, in BC, 14% (609,000) of the provinces' population resides in rural areas (Statistics Canada, 2011). BC is represented by five Regional Health Authorities: Fraser, Interior, Northern, Vancouver Coastal, and Vancouver Island; and two province-wide health authorities: Provincial Health Services Authority and First Nations Health Authority (Government of BC, 2017). Living in rural BC presents a number of challenges to delivering health care services. These challenges stem from multiple factors: geographically dispersed, long distances to urban centers, low population densities, less available health care providers, and inclement weather conditions (BC Ministry of Health, 2015). Each of these factors are pronounced in northern BC coupled with the fact that rural residents are more likely to experience poorer health outcomes as often linked to challenges with social determinants of health, in relation to those in urban areas (Reading & Wien, 2009). However, rural residents are also more likely to report a strong sense of community belonging compared to urban residents (Canadian Institute for Health Information, 2006), which may play a key role in program development for rural communities.

The Northern Health Authority⁶ represents the greatest landmass with the fewest people per square kilometer (Figure 1 and 2) resulting in OAT being less accessible compared to all other health authorities. This is reflected in significantly fewer prescribing physicians, dispensing

⁶ Northern Health Authority can be referred to as NHA, Northern Health, and NH. For the purposes of this paper Northern Health will be used.

pharmacies, and less OAT patients dispersed over large geographical areas in Northern Health compared to other regions in the province (Office of the Provincial Health Officer, 2014). Appendix B compares availability of OAT providers by health authority.

Therefore, with fewer prescribing/dispensing health care professionals, communities with greater isolation, and very low population densities, it may be difficult to locally support OAT for pregnant women (SOGC, 2017b). Concurrently, a lack of training in the treatment of addiction and pregnancy and providers' discomfort with OAT in pregnancy, contributes to wide variations in the quality and availability of care for these women (Jumah et al., 2015). Therefore, understanding the setting where pregnant women with OUD reside may offer valuable insight into accessing treatment.





Source: Government of BC (2017)

Figure 2. BC Population per Square kilometer



Source: Government of BC (2017)

In an analysis of rural definitions, du Plessis, Beshiri, and Bollman (2002), reported that "a community with a given set of distance and density parameters will have different opportunities depending upon the population size and the population density of the region in which the community is located" (p. 33). For this reason, understanding the degree of rurality is vital for determining the level of services required to support pregnant women with OUD.

Defining rural is a complex process that has major implications for policy development, program planning, and funding models; all of which affect accessibility of OAT services for rural women living in BC. While the degree of rurality is an important consideration in the care and management of women with OUD, detailed examination of this process is outside the scope of this paper. However, understanding access to services in a rural context is significant since this has direct implications for program planning and service delivery. Therefore, du Plessis, Beshiri, and Bollman's (2002) "rural and small town" Canadian benchmark definition will be used to guide this paper. Rural and small town refers to the population living outside the commuting zones of larger urban centers of 10,000 or more (du Plessis et al., 2002). While the authors acknowledged that the appropriate definition should be determined by the question at hand, they also believed that having a benchmark definition for understanding Canada's rural population would provide analysts with a good starting point (du Plessis et al., 2002).

Many rural communities in northern BC have extremely low population densities, thus it is unrealistic to believe that all specialized services can be delivered locally in these communities. Nonetheless, it is important that rural pregnant women have access to services when they are ready that reflect high quality patient-centered care. This includes timely access to the following: knowledgeable OAT prescribers in pregnancy; dispensing pharmacies; providers to witness doses if requiring daily methadone administration; and support services (laboratory, mental health, and counselling). In addition to the above prescribing, dispensing, and support services required for rural delivery of OAT, an equity-oriented approach must also be considered. Therefore, to assist pregnant women with OUD who do not have locally available services to support OAT, other options should be considered. Of these, TM is an option that deserves further examination. TM has been explored in the literature as a means to improving access to health services in rural areas by providing a way for primary care providers located in urban areas to deliver care to rural patients in distal locations (Grubaugh, Cain, Elhai, Patrick, & Frueh, 2008). A more detailed account of TM is given in the following section.

Telemedicine

Definition. TM is a relatively new modality for health care delivery that aims to address some of the geographical challenges facing rural populations. By increasing health care access, TM has the potential to enhance health outcomes for populations that otherwise would not receive timely access to services (Fraser et al., 2017). This has major implications for pregnant women living in northern BC with OUD because timelier treatment has the potential to significantly reduce morbidity and mortality for mother and fetus (Finnegan, 2013).

TM and telehealth are often used interchangeably, however telehealth is more of an umbrella-term that encompasses a broad range of applications including tele-education, professional development, or clinician-to-clinician encounters and the term TM is more applicable to primary care services that focus on practitioner-patient encounters (Doctors of BC, 2014). Numerous terms are used to describe TM, the most common of which are asynchronous and synchronous. Asynchronous TM or store-and-forward⁷ involves the exchange of prerecorded data between two or more individuals at different times (WHO, 2010). In contrast, synchronous TM or real time⁸ requires individuals to be simultaneously present for the exchange of information, such as in the case of videoconferencing (WHO, 2010). In both asynchronous and synchronous TM, information may be transmitted using a variety of sources, such as text, audio, video, still images, internet-based platforms, or remote patient monitoring.⁹ These terms are often used interchangeably and without precision.

TM is defined by organizations that include the World Health Organization (2010), Institute of Medicine (1996), The College and Physicians of British Columbia (CPSBC, 2015) and College of Registered Nurses of BC (CRNBC, 2017). Appendix C compares the different definitions of TM. Although differences of opinion exist between the organizations, there appears to be some agreement that TM involves providing care at a distance via technological innovations. CPSBC (2017) use the term to include access to primary care services. Since the central focus of this paper involves the delivery of primary care services, the term TM will refer to "The provision of medical expertise for the purpose of diagnosis and patient care by means of telecommunications and information technology where the patient and provider are separated by distance" (CPSBC, 2015). In addition to the CPSBC (2015) definition and for the purposes of this review, TM will refer to the following: health care professionals located in urban areas (providing site) delivering care to rural patients in distal locations (receiving site) via two-way,

⁷ Store-and-forward: transmission of recorded health history such as pre-recorded videos and digital images (x-rays).

⁸ Real time: Live video: two-way interaction between a patient and a provider using audiovisual technology.

⁹ Remote patient monitoring: patient health data that is transmitted to a provider for tracking and monitoring a health condition (glucose monitoring in diabetes).

interactive videoconferencing. It may be that having a unified definition of TM, in the context of primary care services, will improve buy-in for both providers and patients, as well as promote a better understanding of its benefits.

Perceived benefits. The benefits of TM have been well documented in the literature and include more convenient services, less costs attributed to reduced travel, increased quality in care due to more timely and coordinated services, reduced health system utilization, and improved access to health care services for rural populations (Canada's Health Informatics Association [COACH], 2015; Canada Health Infoway, 2011; Romanow, 2002; WHO, 2010).

Due to the perceived benefits, TM has been integrated into various clinical practice settings with the intention of improving access, quality, and productivity of services for rural populations, including pregnant women (Abrans & Geier, 2006; Dalfra et al., 2009; Hod & Kerner, 2003; Homko et al., 2012; Kerner et al., 2004; Rashiah et al., 2006; Vinals et al., 2005). Likewise, in substance use disorder, internet web-based platforms have been used to provide counselling for those that would otherwise not be able to access services (Campbell, Miele, Nunes, McCrimmon, & Ghitza, 2012; Copeland & Martin, 2004; Rose, Skelly, Badger, Naylor, & Helzer, 2012).

However, despite the vast amount of studies indicating the benefits of TM, many systematic reviews have reported only a small evidence base supporting the use of the modality. In a systematic review of reviews of 80 heterogeneous studies (Ekeland, Bowes, & Flottorp, 2010), 21 studies reported TM is therapeutically effective, reduces health service utilization, and is technically effective; 19 studies concluded that TM is promising but the evidence is incomplete; and 22 studies found that evidence is limited and inconsistent. Two systematic reviews reported a lack of evidence supporting the effectiveness in improving clinical outcomes for diabetes due to diversity in design of the studies: type of technology employed (synchronous/asynchronous); differing health conditions; and evaluation of health outcomes (Farmer, Gibson, Tarassenko, & Neil, 2005; Verhoeven et al., 2007). In two other systematic reviews, McLean et al. (2011) and Flodgren, Rachas, Farmer, Inzitari, and Sheppard (2015) also reported diversity in study design contributed to weaker evidence: three out of 10 studies and 11 out of 93 studies, respectively, reported measuring patient satisfaction and of those the majority were measured with poorly constructed and unvalidated surveys. The Agency for Healthcare Research and Quality (AHRQ) also reported that although TM research offers a wide range of studies in a variety of clinical settings using different modes of delivery, the body of evidence supporting its use has been slow to evolve (AHRQ, 2008). Despite this, TM continues to expand in BC. See Figure 3 for a provincial map of communities in BC with TM capabilities.

British Columbia Communities with Telehealth facilities



Source: PHSA (2017).

As noted by Figure 3, TM in BC is active throughout the province indicating a high level of technical readiness. Technical readiness has been shown to be an important consideration for TM implementation and on-going sustainability of services (Jennett et al., 2003; NIFTE, 2003; Scott et al., 2007). Despite adequate technical facilities, TM services in BC remain fragmented. This may be partly due to the considerable overlap of services provided by three of BC's health authorities - Northern Health, Provincial health Service Authority, and First Nations Health Authority. As TM services in BC continue to grow, there is no consensus on the design, implementation, and evaluation of TM programs or services. This is not an uncommon finding in TM research, and may be due to unclear definitions, different modes of delivery, various contexts to which TM is applied, and various user involvement or interests. For these reasons TM has been recognised as a complex intervention (McLean et al., 2011; Salisberry et al., 2016); therefore, in order to address the question this review seeks to answer, an overview on complex interventions and how this applies to TM is warranted. Only by addressing TM as a complex intervention can we begin to understand the key components that contribute to the effective and efficient design, implementation, and evaluation of TM services.

Complex Interventions. The Medical Research Council (MRC) created a framework for designing, implementing, and evaluating complex interventions to improve health (Craig et al., 2006). Complex interventions are described by Craig et al. (2006) as interventions that contain several interacting components that require clear definitions prior to implementation such as: classifying the variant forms of the intervention; clearly defining the intervention; and establishing the context and environment in which the intervention is being undertaken. TM clearly contains several interacting components that are consistent with being a complex intervention. In order to apply the findings of this review attention to context is crucial: "what

works in one setting may not be as effective, or may even be harmful, elsewhere" (Craig et al., 2006, p. 14). For example, OAT for pregnant women may be completely different in a community of 500 people that is situated 600 km away from basic health care services compared to communities with increased population density and closer proximity to services. Therefore, every attempt was made to establish the various contexts of TM as this has direct implications for the safety of pregnant women with OUD. As set out by the MRC framework (Craig et al., 2006), the process of a complex intervention from development through to evaluation includes a wide range of key components important to the successful implementation of TM. Figure 4 summarizes the main stages of this process.

Figure 4. Key Components of the Development, Implementation, and Evaluation Process





The MRC framework as depicted in Figure 4, begins with developing a theoretical understanding of the likely process of change whereby the intervention (such as TM) can be

reasonably expected to have a worthwhile effect (Craig et al., 2006). Therefore, the development of TM needs to begin with identifying the evidence, identifying/developing theory, and modelling the process and outcomes. Indeed, this process highlights the importance of identifying readiness for change. In the literature, it has been suggested that assessing for readiness prior to implementation is key to the success and sustainability of new innovations such as TM (Jennett et al., 2003). The next section will move on to consider how readiness can be assessed for complex interventions like TM.

Readiness. Readiness for innovation and change has been well-explored in the literature: the freezing and unfreezing model of change (Lewin, 1947/1951); eight critical components of generating transformation in organizations (Kotter, 2012); the movement of a community or individual from pre-contemplation to contemplation (Prochaska & DiClemente, 1982); and the diffusion and infusion of innovations (Rogers, 1983). In repeated studies looking at TM implementation, readiness has been shown to be the foundation of successful implementation (Jennett et al., 2003; Labiris & Petounin, 2004; Muttitt, Vigneault, & Loewen, 2004). TM readiness has been defined "as the degree to which users, healthcare organizations, and the health system itself, are prepared to participate and succeed with telehealth implementation" (The Alliance for Building Capacity (ABC), 2002, p. 29).

Based on the principles of the ABC (2002) model of care, Jennett et al. (2003) developed a readiness framework for implementing TM in rural/remote locations in Canada whereby practitioners, organizations, and patients were assessed for readiness in the context of receiving or providing TM-based services (Jennett et al., 2003). Types of readiness identified were core readiness, engagement, structural readiness, and non-readiness (Jennett et al., 2003). Appendix D outlines the factors affecting TM readiness within four domains (public, patient, practitioner, and organization) and the three types of readiness (core, engagement, and structural). The fourth type of readiness was non-readiness and was characterised by lack of need for change or a failure to recognize such need (Jennett et al., 2003).

In Jennett et al.'s (2003) seminal work, it was found that readiness for change was an integral and preliminary step in the adoption of TM and the level of success was dependent upon the extent to which practitioners and patients alike, perceived the change as needed. As pregnancy is a time when women are more motivated to make a change (SOGC, 2017c), and therefore may be more willing to try TM, understanding readiness in the context of rural populations in BC is critical; especially, given their strong sense of community belonging (Canadian Institute for Health Information, 2006). Thus, ensuring an acceptable level of readiness can offer more seamless transitions from in-person services to TM care at a time when women are at their most vulnerable. Part of achieving buy-in of services from TM users is adequate preparation. When users are not prepared, fear and insecurity can be barriers to successful implementation (Jennett et al., 2003) and for populations that are already vulnerable, this creates additional barriers.

In the 15 years since the development of Jennett et al.'s (2003) readiness framework, it appears that TM programs in BC may have largely been implemented without addressing readiness as evidenced by the PHSA *telehealth* portal (PHSA, 2018). BC TM programs, as commonly developed through this portal, are lacking the translation piece from program into clinical practice. Providers connect via an on-line request form and as long as the sites have technical infrastructure, TM is ready to implement. The provincial wide portal stipulates, *best practice* for TM providers requires the same ethical considerations and are held to the same high standards of quality safe care as in-person services (PHSA, 2018). However, this does not

account for situations where geographic location prevents the standard expected in traditional face-to-face care such as the delivery of OAT for pregnant women living in rural areas with limited access to prescribing, dispensing, and support services. National guidelines for TM design, implementation, and evaluation exist but they have yet to be integrated into BC TM programs. The following section will briefly outline two national TM guidelines that will help address the effectiveness and efficiency of TM applications that is guiding this review.

TM Guidelines. In 2003, The National Initiative for Telehealth Framework of Guidelines (NIFTE) was developed to assist individuals and organizations with the development of TM policy, procedures, guidelines, and/or standards related to five main areas: Clinical practice guidelines; clinical standards; human resources; organizational readiness; organizational leadership; and technology and equipment (NIFTE, 2003). At the time, TM projects and programs were being implemented with little attention towards quality and outcomes related to the delivery of TM services. Instead, TM was being described as one of the most promising interventions for improving access to rural services (NIFTE, 2003; Romanow, 2002). The NIFTE (2003) guideline was designed to provide a benchmark for on-going provision of quality TM services.

In 2007, the benefits of TM had yet to be validated. Identifying and measuring specific outcomes of TM services had remained poorly executed. Therefore, the *National Telehealth Outcome Indicators Project* (NTOIP) was designed to provide a Canadian consensus approach to identification and definition of outcome indicators for evaluation in TM (Scott et al., 2007). The recommendations were based on the work that was conducted through an environmental scan, systematic literature review, a national expert's workshop and a consensus process (Scott et al., 2007). At the time of the inception of the project, there was no regional, provincial, or national

agreement on which quantitative or qualitative outcomes measures were appropriate when evaluating TM applications (Scott et al., 2007). Therefore, NTOIP identified four evidenceinformed outcome indicators specific to TM applications: quality, access, acceptability, and cost (Scott et al., 2007).

Although old, the NIFTE (2003) and the NTOIP (Scott et al., 2007) are not outdated because they continue to serve as a useful point of reference that meet or exceed newer international guidelines. The American Telemedicine Association (ATA) implemented core standards for TM operations in 2007 that continue to provide overarching guidance for updated health-specific guidelines in TM (ATA, 2007): telemental health (ATA, 2010); teleburn (ATA, 2017a); and telestroke (ATA, 2017b). Of note, the ATA (2007) also incorporates the NIFTE (2003) in its guideline development.

At present, both documents (NIFTE, 2003; NTOIP, 2007) have yet to be adopted into mainstream evaluation practices for TM in Canada despite being developed over a decade ago. There are several possible explanations for this. First, there is no consensus on the definition of TM. Second, regulatory bodies emphasize that TM does not alter the professional regulatory requirements around the provision of appropriate care (CPSBC, 2015; CRNBC, 2011); therefore, others may perceive TM guidelines as unnecessary. Lastly, health authorities are not currently promoting the use of these national guidelines to their full extent which implies TM is being viewed as a routine service. The NIFTE (2003) clearly state that TM has yet to be considered a routine service in the delivery of health care.

TM has the potential to improve access to services such as OAT for rural pregnant women; however, as with any health care service, TM patients must be assured of receiving high quality, acceptable, and safe care. By establishing a process for clearly defining TM services, a solid foundation can be developed to which all involved in TM can refer (Scott et al., 2007). Currently, there is no consensus for the evaluation of TM services or the benefits of receiving such care in BC.

Recommendations from the NIFTE (2003), NTOIP (Scott et al., 2007), and Jennet et al. (2003) guidelines provide complementary understanding of quality TM service provision, which is necessary to interpret the findings of this review.

Another important consideration to implementation of TM services is human resources and the role family nurse practitioners (NP) have in providing TM services in BC for prenatal women with OUD. Understanding NP scope of practice is vital when considering how NPs will utilize TM-based services to ensure accessible, quality safe care for vulnerable populations in northern BC. NPs engaged in TM are accountable for practicing in accordance with CRNBC Standards of Practice, and all relevant BC and federal legislation (CRNBC, 2011). Therefore, consideration of what NPs could do regarding their scope of practice will be vital to answering the question this review seeks. The next section will briefly outline the scope of practice for NPs in BC related to the topic of interest in this review.

Scope of Nurse Practitioner Practice

A nurse practitioner (NP) is able to independently diagnose and treat certain diseases and conditions as specified by CRNBC's document Scope of Practice for Nurse Practitioners: Standards, Limits, and Conditions (CRNBC, 2017c). This includes providing prenatal care for patients at any time during the pregnancy prior to delivery. However, this is a professional decision influenced by maternal/fetal complexity and risk, individual provider competence in delivering prenatal care, and patient preference for a provider (CRNBC, 2018). Delivery is
outside of the scope of practice for nurse practitioners, therefore transfer of care to a physician or midwife is warranted.

NPs also have the knowledge and skills to diagnose, provide treatment, and manage substance use disorders. New NP Standards, Limits, and Conditions specifically for induction and continuation/maintenance prescribing of OAT in OUD are now in effect (CRNBC, 2018b). Prescribing privileges will be granted to NPs that meet these standards as set out by CRNBC (2017b) and BCCSU (2017). This includes additional education for NPs prescribing OAT to have knowledge about OUD including treatment (OAT and psychosocial treatment interventions) and harm reduction strategies. NPs will need to obtain an exemption from Health Canada under section 56 of the Controlled Drugs and Substances Act before prescribing methadone (CRNBC, 2018b). CRNBC will apply for this exemption on NP's behalf when they submit their first order for methadone prescription pads. These standards, limits, and conditions do not apply to prescribing opioid agonists for pain or other symptoms (CRNBC, 2018b).

Strengths NPs may bring to addressing the issues of OUD in pregnancy are two-fold. First, NPs endorse an interprofessional approach based on collaboration (CNA, 2011; WHO, 2010). Evidence demonstrates that interprofessional collaborative models of health service delivery can positively impact the management and treatment of vulnerable populations with substance use disorder (Hardin, Kilian, & Spykerman, 2017) and that a variety of interprofessional groups play important roles in the delivery of OAT in BC including: physicians, specialists, nurses, social workers, pharmacists, mental health and substance use counselors, and others (Parkes and Reist, 2010).

Second, one intent of the NP role is to increase access to primary care services for all British Columbians, including those that reside in rural and remote areas. As of February 28, 2017, there were 413 NPs practicing in the province of BC, up 74 from the previous year (CRNBC, 2017b). According to Helen Bourque, the NP lead in Prince George, 31 NPs are currently practicing in Northern Health (personal communication, January 25, 2018). This means that with an increase in provider numbers along with additional OAT specific prescribing privileges, there will be increased numbers of qualified NPs to respond to the opioid crisis in BC.

As front-line health care providers, NPs gain first-hand knowledge of the complexities of the socioeconomic conditions associated with vulnerable populations. This affords NPs an opportunity to influence the social and political trends that are shaping such inequities and move towards more socially responsive ways of delivering primary care (Browne & Tarlier, 2008). In BC, NPs continue to be implemented into new roles, and this may afford opportunities for uncovering new ways of working in primary care such as the use of TM services. Before embarking on any new innovation, primary care providers, including NPs, must determine the impact of the modality on delivering high quality and safe care to vulnerable populations such as pregnant women with OUD in northern BC. For the remainder of this review, the term primary care provider will refer to all providers working in primary care including NPs. The next step is to perform a comprehensive literature search drawing on established methods by Whittemore and Knafl (2005) to answer the research question. The methods used in this process will be described in the next chapter.

Chapter Three

Methods

In this chapter the aim and design method chosen for this literature review is explained. Rationale for the method used, identification of the research question, and an explanation of the search strategy are discussed.

Aim

This review was based on identification of a clear need for better guidance for primary care providers towards improving the timely access of medically appropriate care for pregnant women with OUD in rural BC. This review is highly relevant for NPs as the recent changes to *NP Standards, Limits and Conditions* allow for both the initiation and continuation prescribing of OAT (CRNBC, 2018b). NPs also have a clear mandate that encompasses health promotion, disease prevention, and illness management for some of the most vulnerable populations in BC (BC Charter, 2007; CNA, 2017; CRNBC, 2017c).

The overarching research question this review seeks to address is: Can nurse practitioners deliver effective and efficient TM-based care for pregnant women with opioid use disorder living in northern BC? In order to answer this question and determine if NPs can provide this type of care effectively and efficiently, the following two sub-questions will be addressed:

- 1) Does TM meet the same standards of care as face-to-face?
- 2) Is community readiness an influencing factor for TM implementation?

In order to answer the first sub-question, a comprehensive review of the literature focusing on a quality appraisal of the studies will be completed. For this review, the strength of overall evidence is most important when it is used for guiding practice changes. Given the population of interest in this review, changes in practice can greatly affect the lives of both mother and unborn child. Therefore, addressing the level and quality of evidence is a critical piece of this review. The quality appraisal will be followed by a critical analysis of the relevant studies focusing on the key elements of TM that are foundational when comparing TM with face-to-face care. Therefore, NIFTE (2003), NTOIP (Scott et al., 2007), and du Plessis et al.'s (2002) *National Benchmark Definition of Rural*, will be used to guide this analysis.

NIFTE provide evidenced-informed guidelines for the provision of TM services that examine five main content areas related to TM: 1) Clinical Practice Guidelines (CPGs) and Outcomes; 2) Human Resources; 3) Organizational Readiness; 4) Organizational Leadership; and Technology and Equipment (NIFTE, 2003). In the context of BC, this review will focus only on the first two content areas to answer the first sub-question. As technology and equipment are well-established in BC, this will not be discussed. Although important, organizational leadership will not be included because this review is focusing on issues at the policy level in order to answer question one. Organizational readiness will be addressed in question two.

NTOIP was designed to provide guidance on specific outcome indicators for use when evaluating TM applications and include four categories: quality, access, acceptability, and cost (Scott et al., 2007). Although important, cost analysis is outside the scope of this review and will not be discussed. Therefore, the outcome indicators (quality, access, and acceptability) will be used to evaluate the relevant studies in terms of measurable outcomes.

In summary, a quality appraisal approach to the literature search followed by a critical analysis of the relevant studies will consider these four evidence-informed key elements in light of TM capacity to deliver care that is at least equivalent to the standard expected in traditional health care delivery: assessment of clinical standards in relation to CPGs and TM; attention to the specific outcomes from each study as applied to TM; consideration of the nature and

description of rural within the context of TM; and attention to the mix of health care provider engagement in delivering and evaluating TM (du Plessis et al., 2002; NIFTE, 2003; Scott et al., 2007). In conclusion, the quality appraisal and the four elements of TM will be used to assess the quality and quantity of evidence for determining if TM can provide comparable care to in-person services. The aim of this review will now move on to the second sub-question in this review.

The second sub-question will be addressed using Jennett et al.'s (2003) TM readiness framework to identify the different degrees of community readiness discussed in the selected studies and to determine if this may be an influencing factor for TM implementation. This is of central interest for rural communities in BC because resources are limited and the benefits of TM have yet to be determined, which highlights the potential for harm to populations that have historically received fragmented and in some cases, culturally unsafe care. The central focus of this review is directed towards rurality because of the inequities that exist between BC's urban and rural populations (Ministry of Health, 2015) and as a result NPs have a duty to provide equitable care to those that need it most (CNA, 2017). Much of BC is rural with small dispersed populations and with that comes challenges of fewer providers (Ministry of Health, 2015). However, increasing numbers of NPs in BC can help mitigate provider shortages along with new innovative ways of delivering primary care. TM-based care can provide access to services that otherwise may not exist for rural populations; however, if communities are not ready then a system promoting TM will need to overcome these challenges to succeed in delivering services to BC's most at-risk populations.

Design

A literature review can be considered a critical summary of research on a topic of interest. An integrated literature review was chosen as it permitted the inclusion of a wide range

of sources, including qualitative and quantitative data, methodologies which were perceived to be appropriate to answer the research question (Whittemore & Knafl, 2005). Therefore, this review is guided by Whittemore & Knafl's (2005) method. According to the authors, an integrative review is one of the broadest types of research review methods and with the inclusion of both experimental and non-experimental data, it allows the reader to have a more in-depth understanding of the phenomenon of interest (Whittemore and Knafl, 2005). TM is a complex intervention that requires a variety of methods to capture the knowledge required to fully understand the intervention in the context of rurality, making an integrative review an ideal method to answer the question.

According to Whittemore and Knafl (2005), "data analysis in research reviews requires that data from primary sources are ordered, coded, categorized and summarized into a unified and integrated conclusion about the research problem" (p. 550). To start, relevant data was abstracted, analyzed, and summarized using a literature review matrix. Column headings in the matrix were guided by John Hopkins literature appraisal guidelines (2017) and Whittemore and Knafl (2005). Details of quality, reliability, strengths, and limitations of each article were summarized in a shortened version of the literature review in Appendix E. The matrix was modified accordingly as findings were presented in Table format within the body of this review where appropriate to help identify important information. The process of data analysis in this review included using a constant comparison method as recommended by Whittemore and Knafl, (2005). The studies were evaluated using the following strategies: overall quality, and identification of patterns, themes, variations and relationships. They were then further analyzed and synthesized using data display, data comparison, conclusion drawing and verification. Accordingly, the results from each study were displayed on a flip chart and common themes

were assigned a number and counted. The data were compared and then checked and rechecked for verification. Next, the search strategy will be described.

Search Strategy

The importance of a thorough search strategy cannot be underestimated. A comprehensive search strategy ensures all relevant information and data is reviewed, which enables the author to extract applicable content to inform the research question. The literature search was conducted using the electronic online databases through the University of Northern British Columbia library: CINAHL (EBSCOhost), Medline (Ovid), and PubMed. These data bases were chosen as they are specific to many healthcare-related journals. The search terms were based on the research question and were combined using "AND" or "OR" and all MeSH terms were exploded in order to decrease risk of omitting important literature (Table 3).

Table 3. Search Terms

Telehealth OR telemedicine OR telehealthcare
AND
Rural OR remote OR rural health OR rural health services
Limits: From the year 2005 to present

A preliminary search suggested that TM research became more prominent around 2005, particularly in the case of videoconferencing. Therefore, 2005 was chosen as the starting point for this integrative review. Likewise, it was found that by adding the search term pregnancy, mental health, and/or substance use, results were narrowly confined to the use of TM in home-monitoring or self-monitoring which is outside the scope of this question. Therefore, search terms were intentionally kept broad to capture the breadth and depth of the current literature on the use of TM for rural populations. By taking out the search term pregnancy, results now included both female and male populations. Again, to narrow this further to entirely female populations would have excluded valuable information helpful towards addressing the two

specific sub-questions as well as the overarching question which guided this review. Therefore, both male and female populations were included and although this was a recognized limitation, given the scant information available about rural pregnant women with OUD who had access to TM, the search was inclusive enough to consider populations that had similar health disparities, inequities, and/or higher risk medical conditions to the population of interest in this review such as chronic diseases, mental health disorders, substance use, pregnancy, or cancer related treatment.

The literature search strategy for this integrative literature review occurred in four stages, including (1) screening the titles of articles; (2) reviewing abstracts of articles; (3) reviewing full text of articles; and (4) applying exclusion (Table 4) and inclusion (Table 5) criteria to full text articles.

Table 4. Exclusion Criteria

- TM for palliative care (does not fall under health promotion, disease prevention, or primary care)
- Papers published before 2005
- Studies specifically directed at developing nations where primary care access and standards of health care are not generalizable to Canada's health care system
- TM delivered via telephone, internet-based platforms, home-monitoring devices, store and forward (e.g. glucose monitoring devices)
- < 19 years of age
- Languages other than English
- If health care professionals delivering the care did not include one of the following: General practitioner (GP), nurse practitioner (NP), advanced practice nurse (APN), registered nurse (RN) or specialist.
- If TM services included clinician-to-clinician encounters

Table 5. Inclusion Criteria

- Published in English
- Published from 2005 to present
- Adults > 19 years old
- Original research articles
- Qualitative, quantitative, or mixed studies
- Peer-reviewed journal articles
- Mode of TM delivery had to include videoconferencing
- Health care professionals delivering the care had to include at least one of the following: GP, NP, APN, RN, specialist
- Studies based in any country, provided that primary care access and standards of care were similar to Canadian health care standards.
- High risk health conditions/diseases/health disparities Chronic diseases, mental health, substance use, pregnancy (EXCEPT palliative care)
- Delivery of services must include clinician-to-patient care encounters
- Published pilot projects
- Grey literature in BC studies specific to delivering TM care to rural populations

An unexpected finding of this literature search was the number of pilot projects. A decision to include these studies was made based on their utility of contributing to a deeper understanding of the topic for this review, provided all other inclusion/exclusion criteria were met.

The combination of MeSH terms (Table 6) yielded 558 articles in the three selected databases. After duplicates were removed and titles and abstracts were screened, 23 articles were

selected, and full articles were read for inclusion/exclusion criteria. Eleven articles met the criteria for this review. Table 6 illustrates a summary of the full search process.

Table 6. Search Strategy and Results

CINAHL, Medline & PubMed Total records obtained from database searches	n= 558		
	Duplicates removed	n=5	
Titles & abstracts screened using inclusion & exclusion criteria	n=553		
	Records excluded	n=530	
Full text review for inclusion/exclusion Criteria	n=	23	
	Records excluded	n=13	
Full articles selected for review	n=	11	
Total articles for review			
n= 11			

To conclude this section, the final sample for this integrative review included 11 articles from a wide variety of methods: randomized controlled trials, mixed-method study, qualitative interviews, and quantitative instrument development designs. The majority of studies were conducted outside of Canada: seven in the United States (U.S.) and two in Australia (Appendix F). These studies were considered suitable for inclusion in this review because rural populations in the U.S. and Australia experience significant health disparities compared to their urban counterparts (Australia Bureau of Statistics, 2011; Center for Disease Control and Prevention, 2013) that are similar to Canadian and northern British Columbian rural residents (Ministry of Health, 2015).

As determined by the inclusion/exclusion criteria, the study populations consisted of both men and women with various at-risk health conditions or populations with an increased risk for vulnerability due to health disparities and/or inequities (Appendix E): Nine studies included atrisk populations consistent with the population of interest in this review (HIV, Hep C, mental health, cancer screening and treatment, poor pregnancy prognosis, and abortion). Both HIV and hepatitis C (Hep C) are chronic diseases that have been associated with higher rates among pregnant women with OUD (SOGC, 2017c). Mental health disorders are known to often co-occur with substance use and likewise, addiction is common in people with mental health issues which often entails similar treatments (National Institute on Drug Abuse, 2012). This is a topic well beyond the scope of this paper and is only presented to identify common features to the population of interest, thus indicating the studies were suitable for inclusion. Further, two studies (Holyk, Pawlovich, Ross, & Hooper, 2017; Ross, Yap, van der Nest, Martin, & Edie, 2016) included rural First Nations populations. Indigenous peoples living in remote rural communities face considerably poorer health outcomes, as often linked to challenges with social determinants of health, in relation to those in urban areas (Reading & Wien, 2009), thus indicating these studies were also suitable for inclusion.

In the next chapter, the two sub-questions outlined previously will be addressed in order to answer the overarching research question.

Chapter Four

Findings

Quality Appraisal

This section will begin with a quality appraisal of the relevant studies to answer the firstsub-question: Does TM meet the same standards of care as face-to-face? Evaluating the quality of primary sources in the integrative review is a complex process, especially when the research designs are diverse, such as in this review. According to Whittemore and Knafl (2005) "no gold standard exists for evaluating and interpreting quality in research reviews" (p. 550). Further, the authors also state that in an integrative review with diverse empirical sources, it may be reasonable to evaluate methodological quality to determine if it is "a viable reason for the discrepant finding" (p. 550). As discussed earlier, the level and quality of evidence is critical for the population of interest in this review, especially when the findings can be used to guide changes in practice.

Evaluating the quality of the literature was completed using the John Hopkins Nursing Evidence-based Appraisal Tool (2017). The tool was used as a guideline to address rigor, validity, and strength of evidence of each of the eleven articles. Permission was granted for use in this study. Appendix F outlines the appraisal tools used.

To determine if TM can meet the same standards of care as face-to-face, study design and data collection methods were analysed and appraised below.

Study methods. A variety of methods were employed by the authors of the selected studies to assess the use of TM-based care. Each has its advantages and drawbacks. Although measurable outcomes played a significant part in the quality appraisal of the studies, this will not be discussed in detail for this section other than to report on the reliability and validity of the data

collection methods used. An in-depth discussion of the clinical outcomes will resume in the next section on the key elements of TM.

Two studies (Morland et al., 2010; Morland et al., 2015) used non-inferiority randomized controlled trial methods. The benefit of this approach is that non-inferiority trials aim to show that the new treatment is not inferior or "materially worse than the control" (U.S. Department of Health and Human Services Food and Drug Administration, 2016), in this case the comparator being face-to-face care. As NPs are responsible and accountable for providing safe and appropriate care (CRNBC, 2015; CRNBC, 2017c), TM-based services need to provide comparable outcomes to in-person care in terms of effective and efficient outcomes. The use of appropriate reliable and valid patient reported outcomes (PROs) were employed in Morland et al. (2010; 2015), see Appendix E for further details. The PROs were consistent with each study's focus of providing evidence-based treatment of mental health disorders. This ensures that the instrument is not only measuring what it is supposed to but that it is providing dependable and accurate results. A major strength of these two studies (Morland et al., 2010; Morland et al., 2015) was that there was strong evidence demonstrating that TM produced similar outcomes to in-person care using valid PROs with substantial follow-up (baseline, post treatment, 3-month, and 6 month) with participants.

Validated veteran-specific satisfaction surveys were employed in both studies by Morland et al. (2010; 2015), however they were neither designed nor validated for TM which limits generalizability to other populations. Morland et al. (2015) also reported using a TMspecific satisfaction survey designed by Frueh, Henderson, and Myrick (2005) but it has yet to be validated. Despite these limitations, Morland et al. (2010; 2015) reported sufficient sample sizes, adequate randomized control of participants and consistent definitive conclusions, thus were rated of high quality.

An exploratory-descriptive qualitative design was employed in three studies (Grindlay, Lane, & Grossman, 2013; Jhaveri, Larkins, Kelly, & Sabesan, 2016; Wyatt et al., 2013). This type of research is commonly used in situations that lack clear description or definition with a specific population which makes it a highly suitable method for evaluating the use of TM with at-risk rural populations. All three studies reported sufficient sample sizes, used either convenience or purposeful sampling methods, provided definitive conclusions based on appropriate data collection methods, thus were rated of high quality (see Appendix E for more details). A major strength in the quality of these studies was that they provided in-depth information on participant experiences as well as specific characteristics, such as locality (TM providers and patients) of TM-based services.

A mixed-method approach was used in one study (Ohl et al., 2013). A major advantage of this approach is that it can capitalize on the strengths of both qualitative and quantitative methodologies to provide a more comprehensive understanding of complex interventions such as TM (Caffery, Martin-Khan, & Wade, 2016). For the quantitative evaluation, Ohl et al. (2013) used a quasi-experimental non-random one-group pre/ post-test design which was appropriate due to the given geography (limited availability of sample sizes with multiple dispersed rural locations). Response to treatment indicators reflected current professional practices, however the study included 17 different outcome measures whereby not all of the measures were a part of usual in-person care. This was reflected in several health screening measures (syphilis screening, vaccinations, tobacco and alcohol use, and depression) not being included in usual care but were later introduced as part of TM care. The authors acknowledged the discrepancy; however it

remains unclear if TM or other variables were responsible for the improvements in screening measures. Although this limitation affects the analysis of the article, the study is still included because it highlights the lack of valid measurable health outcomes in TM research; which is a problematic issue that has previously been identified in the literature (NIFTE, 2003; Scott et al., 2007).

Similar to the satisfaction surveys in Morland et al. (2010; 2015), a veteran-specific survey was also used in Ohl et al. (2013) which in turn limits generalizability to other populations. Limitations of the study included a lack of adequate power (Ohl et al. 2013), and not all participants were part of the same pre and post-test group, which threatened both internal and external validity. Due to these methodological flaws this study was rated as low quality, thus results must be interpreted with caution. However, the qualitative evaluation of this mixed method study provided several contributions and so remained in the review.

For the qualitative evaluation of the mixed-method study, Ohl et al. (2013) employed appropriate qualitative data collection methods (Appendix E) and reasonably definitive conclusions based on participant experiences with TM use that included stigma and privacy, improved access and health care provider roles. Limiting the conclusions of this study was the lack of participants' verbatim responses which increases confirmability between participant experiences and the explanation of themes. However, the in-depth program planning with patients and health care providers that took place before, during, and after TM program implementation was a clear strength because it assists organizations in ". . . defining their client population and their health-care problems, how these health-care needs can be met, and why telemedicine is the best way of meeting these needs" (Jennett et al., 2003, p. S2:28). One study (Nazareth et al., 2013) employed a four year quantitative longitudinal design. Quasi-experimental studies are frequently used when randomizing by location or subjects is difficult (Harris et al., 2006). Since randomisation was problematic because of smaller populations geographically dispersed (Nazareth et al., 2013), rationale was suitable. The study's four year duration was a strength as it provided adequate time to identify trends. A TM-specific satisfaction survey was administered and all questions were reported within the study but the psychometric properties were not evaluated and it is not known if the survey had been previously validated.

Similar to Ohl et al. (2013), the appropriate use of response to treatment indicators were used in Nazareth et al.'s (2013) study, however, the authors acknowledged two limitations: The study was not controlled and confounding factors were not analysed between the groups (Nazareth et al., 2013). Of note, while the sample size may have been sufficient, power analysis was not reported. These limitations made it difficult to know whether outcomes were due to the intervention (TM) or due to other differences between the groups. Therefore, this study was rated of low quality and results must be interpreted with caution.

Quantitative pilot projects were utilized in three studies (Hassija & Gray, 2011; Hitt, Low, Bird, & Ott, 2013; Ross et al., 2016). Pilot studies are appropriate methods for the initial phase of determining the feasibility of delivering a specific healthcare service and play a key role in the development or refinement of new interventions (Leon, Davis, & Krawmer, 2010) such as TM.

Hassija and Gray's (2011) pilot study provided reasonably consistent results for a small sample size. Cohen's d was used to calculate treatment effect size. The study used well-known reliable and valid data collection tools for patients with mental health disorders (DSM-IV

criteria, PTSD checklist, CES-D depression scale etc.), similar to Morland et al.'s (2015) RCT. Results were also consistent with the RCT (see Appendix E for further information). TM satisfaction was measured using the Wyoming Telehealth Trauma Clinic Satisfaction Scale that was specifically designed for the study (Hassija and Gray, 2011), but it is not known if this was validated.

Hassija and Gray (2011) failed to report on adequate power. The probability of obtaining adequate power with such a small sample size was low, and the findings would have been far more persuasive if the authors had reported the analysis and the limitations, such as what the probability was of finding real differences (power) and what were the changes from pre to post regardless of statistical significance (effect size). In light of these limitations, the study was downgraded to good quality.

Hitt et al.'s (2013) study consisted of a large sample size and an adequate study duration of one year; however, adequate power was not reported nor was statistical analysis. Further, client satisfaction was based on a one question survey, thus this study was rated as low quality and results should be interpreted with caution.

Ross et al.'s (2016) study consisted of an insufficient sample and no statistical analysis was reported, thus this study was rated low quality and results should be interpreted with caution. The study appeared to have used a TM-specific satisfaction survey, but sample questions and psychometric properties of the survey were not reported; therefore, it is unknown which survey was used (Ross et al., 2016). Feasibility results may not be necessarily generalizable but all three studies reported findings that can guide in the design and implementation of future studies.

Holyk et al. (2017) used a quantitative survey that consisted of definitive conclusions based on good statistical analysis and an established p<0.05 as statistically significant (see

Appendix E for details). Power analysis was not reported and there was an increased risk of nonresponse bias; however, the surveys were clinician administered and might have had a higher response rate. Holyk et al. (2017) adapted their TM satisfaction survey from two previous TM studies (Field, 1996; Holden & Dew, 2008). Adaptations and psychometric properties were not reported. Although sample survey questions were not reported in the published article, an unpublished version of the article reported in-depth details on the questions used. Permission was granted to use the unpublished version in this review. For the remainder of this review, references made to Holyk et al.'s (2017) study will refer to the published version unless indicated otherwise. A strength of Holyk et al.'s (2017) study was that the survey was informed by Browne et al.'s (2015) EQUIP-PHC study (providing equity-oriented care based on principals of harm reduction, cultural safety, and trauma and violence-informed care) which resonates with this population of interest in this review. Due to sampling bias and lack of validity in data collection methods this study was rated of good quality.

This completes the quality appraisal of the evidence. Using the John Hopkins (2017) guide (Appendix F), Table 7 outlines the level and quality of evidence for each study. No study was excluded based on methodological grounds (Whittemore & Knafl, 2005). Whilst limitations were identified in the studies, these were not to an extent that warranted exclusion from the review. Overall, these studies help to answer the question this review seeks by contributing to a more in-depth understanding of the quality of evidence in TM research. As noted by Table 7, the level and quality of evidence varies across the studies.

Author & Date	Evidence Type	Evidence Level & Quality
Morland et al. (2010)	RCT	Level I A
Morland et al. (2015)	RCT	Level I A
Nazareth et al. (2013)	Quasi-experimental	Level II C
Grindlay et al. (2013)	Qualitative (descriptive)	Level III A
Wyatt et al. (2013)	Qualitative (descriptive)	Level III A
Jhaveri et al. (2016)	Qualitative (descriptive)	Level III A
Hassija & Gray (2011)	Quasi-experimental (pilot	Level III B
	project)	Level III B
Holyk et al. (2017)	Quantitative (unpublished)	
Ohl et al. (2013)	Mixed-methods	Level III C
Ross et al. (2016)	Quantitative (pilot project)	Level III C
Hitt et al. (2013)	Quantitative (pilot project)	Level III C

Table 7. Evidence and Level of Quality Guide

Further evaluation is needed to determine the meaning and relevance of the evidence to answer the first sub-question. At a glance, the evidence suggests that weak methodological quality may be a viable reason for poorer outcomes. Therefore, a critical analysis of the literature focusing on the four evidence-informed key elements of TM will be presented next. Following this will be a summary of the quality and quantity of the evidence.

Key Elements of TM

As previously discussed, four key elements of TM were identified in the literature (du Plessis et al., 2002; NIFTE, 2003; and Scott et al., 2007) and include: CPGs, clinical outcomes, rural settings, and human resources. These elements are considered foundational when comparing TM with face-to-face care for the topic of interest in this review. Table 8 outlines each element, indicator, and measurable outcome for TM that will be further evaluated in each of the relevant studies.

Element	Outcome Indicator	Measures
CPGs	Clinical Practice Guidelines	Transparency reporting
		Current professional
		knowledge
Clinical Outcomes	Quality: Health status	Response to treatment
		Patient reported outcomes
	Acceptability: TM users	Patient/provider satisfaction
	Access: Utilization of services	Timeliness, reduced travel,
		increased access
Rural Settings	Benchmark definition	Transparency reporting
		Current professional
		knowledge
Human Resources	Mix of health care professionals	Transparency reporting
		Current professional
		knowledge

Source: du Plessis et al. (2002); NIFTE (2003); Scott et al. (2007).

Therefore, the focus of this section is to provide a critical analysis of the relevant studies considering these four key elements in light of TM capacity to deliver care that is at least equivalent to the standard expected in traditional health care delivery.

CPGs. According to the BC Health Care Charter (Ministry of Health, 2007), there is an expectation that TM needs to meet the same standards of care as face-to-face services; otherwise, as primary care providers we will fail to meet the standards of practice (CRNBC, 2017c). The purpose of clinical practice guidelines is to promote "best practice" and improve the delivery of health care services. The Institute of Medicine (2011) offers the following definition: "Clinical Practice Guidelines are statements that include recommendations intended to optimize patient care that are informed by a systematic review of evidence and an assessment of the benefit and harms of alternative care options" (p. 15). However, the challenge is whether existing CPGs can be safely applied to TM applications. NIFTE (2003) reported that depending on the TM

speciality and clinical application, modifications to CPGs may be required. Therefore, in the following Table 9, each study was evaluated for use of CPGs and any modifications that were required.

	Table 9.	Clinical	Practice	Guidelines
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Clinical area	CPGs	Modifications
		T
Procedures	Colposcopy	Training of RS providers in
		colposcopy; procedure is
		supervised by OBGYN at PS
	Ultrasound monitoring of at-	unknown
Madiantian administration	Chamatharany ³	DS providor training:
Medication administration	Chemotherapy	RS provider training,
		given at PS for safety):
		Procedure is supervised by
		PS
	HIV ⁴	Unknown
	Hep C ⁵	Blended services: Detailed
		patient diary of adverse
		events; CPGs sent to RS
		providers; RC & patients
		aware of what to do if
		adverse events occur
	Medication assisted abortion ⁶	Alternate consent form;
		medication was given using a
		remotely operated lock box
Primary care	General ⁷	Blended services
	0	Relationship-based care
	General ⁸	RS provided with a list of
		acceptable health conditions
		for TM visits
		Blended services
	Mental health ^y	First 1-2 sessions devoted to
		rapport building then
		treatment resumed
	Mental Health ¹⁰	unknown
	Mental Health ¹¹	unknown

¹Hitt et al. (2013); ²Wyatt et al. (2013); ³Jhaveri et al. (2016); ⁴Ohl et al. (2013); ⁵Nazareth et al. (2013); ⁶Grindlay et al. (2013); ⁷Holyk et al. (2017); ⁸Ross et al. (2016); ⁹Hassija & Gray (2011); ¹⁰Morland et al. (2010); ¹¹Morland et al. (2015). RS: receiving site; PS: providing site; FTF: face-to-face; blended services: combination of TM & FTF; **Information for CPGs and modifications are entirely reliant on the transparency of reporting, thus information was not available for all studies.

Specific CPGs were evident in nine studies (Grindlay et al., 2013; Hassija & Gray, 2011; Jhaveri et al., 2016; Morland et al., 2010, 2015; Nazareth et al., 2013; Ohl et al., 2013; Wyatt et al., 2013) and modifications to CPGs were reported in seven of the 11 TM studies. Three studies (Grindlay et al., 2013; Jhaveri et al., 2016; Nazareth et al., 2013) were concerned with the safety of administering medications via TM. Modifications to CPGs in these studies included: administering the first medication dose (chemotherapy) at the providing site and if there were no adverse reactions, patients continued therapy in their local community with TM support (Jhaveri et al., 2016); the use of a remotely operated lock box, as a safety feature, to administer a witnessed medication dose for medically assisted abortion (Grindlay et al., 2013); and pathways outlining safety precautions of Hep C medications (e.g. patient diary recording adverse events, receiving site providers having access to the most recent CPGs, and clear instructions for emergency contacts in the case of an adverse reaction) (Nazareth et al., 2013).

In two studies, (Hitt et al., 2013; Jhaveri et al., 2013), CPG modifications for colposcopy services and chemotherapy treatment, respectively, included additional training for rural providers so that the procedures could be offered in communities where patients would otherwise have to travel or not receive care at all. In one study, Ross et al. (2016) reported the use of specific criteria for screening patients at the receiving sites for conditions and symptoms deemed inappropriate for TM. A limitation of this strategy is that criteria originated at the providing site and was initiated at the receiving site with little input from rural providers. The implication here being that little consideration was given to the scope of practice or level of comfort for the individual rural providers.

In four studies (Holyk et al., 2017; Jhaveri et al., 2016; Nazareth et al., 2013; Ross et al., 2016), a blended model approach was utilized to assist and augment existing in-person services

with TM-based care. This suggests that routine face-to-face services may need to be modified for TM in order to provide effective and efficient care for rural patients. This is supported by two studies that were concerned with building trust with rural patients. Hassija and Gray (2011) modified the delivery of trauma-focused psychological treatment by allocating the first two TM sessions for rapport building prior to commencing therapy. Holyk et al. (2017) also was concerned with rapport, trust, and relationship building. Holyk et al.'s (2017) study focused on patient perceptions of culturally safe care. Table 10 lists the survey questions and patient responses (%). Survey questions were obtained from the unpublished version of Holyk et al.'s (2017) article.

Table 10. Safe and Respectful Environments

Welcomed by staff	87% A/U	Receptionist respectful	79.5 A/U
Welcoming clinic space	88% A/U	HCP makes patient comfortable	95% A/U
Physically and emotionally	91% A/U	HCP considerate of patient needs	95.5% A/U
safe			
Treated with dignity and	91% A/U	HCP comfortable discussing	93% A/U
respect		healthcare	
Discriminated by staff	86% N	HCP comfortable discussing	95% A/U
		anything	

Information adapted from: Holyk et al. (2017) unpublished version. A/U = Always/Usually; N = Never

Overall, the results of the survey indicated that patients felt safe and were well-respected. Holyk et al. (2017) reported that although 86% of patients did not feel discriminated against, this also indicated that 14% of people felt that at some point staff had discriminated against them, suggesting an area for improvement. Holyk et al.'s (2017) study provided valuable data on the importance of addressing relationship-based care within TM services – specifically, with populations where structural inequities are at the root cause for poorer health outcomes.

In two other studies that provided psychological treatment via TM (Morland et al. 2010; Morland et al., 2015) it was not clear if CPG modifications were warranted due to the exclusion criteria (medication regime less than 45 days, substance use disorder and unwillingness to refrain during treatment and suicidal ideation). The degree of modification required for existing CPGs in cases like this is largely unknown when it comes to their use in delivering services via TM which implies that safety may be an issue. NIFTE (2003) reported the following about appropriate care via TM:

The "appropriate" or "reasonable" standard of care (considering context, location and timing) delivered via telehealth should be at least equivalent to the standard expected in traditional health care delivery, where such a comparator exists. If the "reasonable" standard of care cannot be met, the telehealth professional needs to address what is the alternative for care and decide if it is acceptable to proceed (p. 33).

Overall, these findings suggest that current standards of care were being applied in the studies. However, the problem is not with the application of best practice, it is about whether or not CPG modifications are needed for safe delivery of TM-based services. Only five of the 11 studies specifically addressed the modifications required for the delivery of safe care via TM. While there is evidence of safe care being provided with modifications to CPGs in TM, a lack of reporting among the studies in this review precluded further analysis. The quality of evidence ranges from poor to high within the studies, thus the findings need to be interpreted with caution.

As no comprehensive guidelines exist for managing the care of rural pregnant women with OUD (Jumah et al., 2015; SOGC, 2017b), safety of delivering treatment to this population will need to be considered. For example, complicating factors include the lack of dispensing pharmacies, OAT prescribers, and other support services within the local setting, which challenges access to medication as well as with ongoing health monitoring or dose adjustment issues. Thus, considering the context, location, and timing of providing care for pregnant women with OUD, these findings suggest that the reasonable standard of care for face-to-face encounters may need to be modified for TM in order for primary care providers to deliver effective and efficient care.

Clinical outcomes. Due to evidence-informed practice, interest in comprehensive evaluation of clinical outcomes is increasing (Scott et al., 2007). The literature on TM indicates that there is a lack of evaluation being applied in the area of clinical outcomes (NIFTE, 2003, Scott et al., 2007). Identification of appropriate indicators, their consistent description, and their consistent application in demonstrating comparable care to in-person services is lacking (Le Rouge, Garfield, & Hevner, 2015; Scott et al., 2007). For this review quality, access, and acceptability will be used to evaluate the clinical outcomes in the relevant studies.

Quality. Quality of care refers to "the degree to which the health-care services for individuals and populations increased the likelihood of desired health outcomes and is consistent with current professional knowledge" (Scott et al., 2007, p. S2:6). The health status of patients is recognised as an evidenced-informed indicator of quality care that can be measured by the use of patient reported outcomes (PROs) or response to treatment disease-specific criteria.

Three studies (Hassija and Gray, 2011; Morland et al., 2010; Morland et al., 2015) employed the use of PROs and two studies (Nazareth et al., 2013; Ohl et al., 2013) reported on response to treatment outcomes. Table 11 highlights the measurable outcomes for the five studies. There are limitations of comparing heterogeneous data. However, there are few opportunities in TM research to compare the same mode of delivery with similar health care services for rural populations where proximity to services is equivalent.

Study	Measurable Outcome	Scores	
Morland et	PROs	ТМ	FTF
al. (2010)	Significant symptom	Baseline 56.7 (SD	Baseline 55.0 (SD10.3)
	reduction (complex mental	12.00)	6m- posttreatment 46.6
	health)	6m-posttreatment	(SD 15.6)
		42.0 (SD 15.6)	
Morland et	PROs	ТМ	FTF
al. (2015)	Significant symptom	Baseline 67.6 (CI	Baseline 67.3 (CI 62.5-
	reduction (complex mental	63.7-72.5)	72.1)
	health)	6m follow-up 46.5	6m follow-up 52.3 (CI
		(CI 35.3-57.7)	39.6-65.0)
Hassija and	<u>PROs</u>	One group TM	
Gray	Significant symptom	Baseline 50.07 (SD 17.	77)
(2011)	health)	Posttreatment 32.20 (SI	D 12.68) Cohens d 1.17
	nearth)	Baseline 27.47 (SD 14.	12)
		Posttreatment 13.07 (SI	D 9.07) <i>d</i> 1.24
Ohl et al.	RTT	One group TM	
(2013)	Maintained undetectable	Pre-TM	Post TM
	viral loads	N=15 100% viremia	N=23 95% viremia
	Improvement in health	control	control
	screening		
	(HIV – complex chronic	Routine screening not	P=<0.05 improvement
	disease management)	done	in screening measures
Nazareth et	RTT	ТМ	FTF
al. (2013)	Maintained undetectable	Sustained virological	Sustained virological
	viral loads (Hep C –	response >24w	response >24w
	complex chronic disease	posttreatment = 72%	posttreatment = 68% (CI
	management)	(CI 95%)	95%)

Table 11. Patient Reported Outcomes and Response to Treatment.

PROs: patient reported outcome; RTT: response to treatment

Three studies (Hassija and Gray, 2011; Morland et al., 2010; Morland et al., 2015) were concerned with demonstrating that TM-based care provided comparable outcomes to in-person services. The advantage of this is that TM becomes a supplement to existing services and not a replacement which may lead to buy-in of services for both patients and TM providers (Jennett et al., 2003). Hassija and Gray (2011), Morland et al. (2010; 2015), demonstrated good to high

quality evidence that TM provided comparable care to face-to-face in the management of complex mental health. The PRO tools used in each study were appropriate for measuring mental health symptoms and were consistent with current professional practice (see Appendix E for more details). Further, the consistent application of PRO tools employed in the three studies (Hassija and Gray, 2011; Morland et al., 2010; Morland et al., 2015) helps to inform TM providers in a meaningful way that under these circumstances TM can produce similar outcomes.

The remaining two studies (Ohl et al., 2013; Nazareth et al., 2013) involved chronic disease management of HIV and Hep C, respectively using response to treatment outcomes for maintaining undetectable viral loads. While measuring viral loads in response to treatment is consistent with current best practice and findings show that TM can provide comparable care (Nazareth et al., 2013; Ohl et al., 2013), methodological flaws limit these findings; thus, results need to be interpreted with caution. Further, if TM outcome indicators are to be useful, they must be chosen to specific criteria rather than in an *ad hoc* manner (Scott et al., 2007). This was reflected in comparing health screening measures between TM and face-to-face when in-fact screening was not part of usual care (Ohl et al., 2013). Another important consideration is that response to treatment measures are limited in terms of being surrogate endpoints, however, they are valid clinical measures that are currently in use and it is quite likely that for the population of interest in this review, future research will include similar surrogate endpoints.

Overall, three studies of good to high quality (Hassija and Gray, 2011; Morland et al., 2010; Morland et al., 2015) provided well-defined valid outcome measures that were able to inform providers, patients and organizations that the health status of patients could be maintained with the use of TM. However, due to poor quality and inconsistent application of outcome indicators in two studies (Nazareth et al., 2013; Ohl et al., 2013), it was not possible to draw

conclusions that patient health status could be maintained with TM. The implications of providing quality care via TM for pregnant women with OUD are far reaching: OAT has been shown to mitigate or reduce the medical, social, and legal consequences associated with OUD for both mother and fetus. Therefore, the appropriate identification and definition of valid outcome indicators for evaluating OAT in pregnancy via TM is needed, not only because of the substantive outcomes of relevance to patients but it also permits clear demonstration of value to policy and decision makers.

Acceptability. Acceptability refers to "the degree to which patients, clinicians, or others are satisfied with a service or willingness to use it" (Scott et al., 2007, p. S2:6). Patient satisfaction is an important and commonly used indicator for measuring the acceptability of health care services, especially in TM (Scott et al, 2007; Whitten and Love, 2015). Only four of the eleven studies (Hassija and Gray, 2011; Holyk et al., 2016); Morland et al., 2015; Nazareth et al., 2013) employed TM-specific surveys. The benefit of this approach is that it helps to identify the aspects that are important and specific to a TM encounter such as patient perceived benefits and the quality of technology (Le Rouge et al., 2015). In the articles, the tools and measures were diverse but in all instances non-validated surveys were employed (Hassija and Gray, 2011; Holyk et al., 2017); Morland et al., 2015; Nazareth et al., 2013). Two studies (Hassija and Gray, 2011; Nazareth et al., 2013) clearly stated what they were measuring in terms of satisfaction and provided sample questions and responses. Morland et al. (2015) and Holyk et al. (2017) identified the satisfaction tool employed but then did not provide clarity on the outcomes or provide sample questions. As previously noted, the unpublished version of Holyk et al. (2017) reported sample questions which provided a clear and concise outline of the tool that was used; thus, increasing generalizability and reproducibility of the results. Table 12 outlines the questions from the four TM satisfaction scales and bolded items represent commonalities between the

scales.

Table 12. TM Satisfaction Scales.

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Bolded represents commonalities.

From a broad perspective, studies were concerned with measuring patient satisfaction with TM. This included: technical aspects such as sound and video quality; social aspects such as communication and provider helpfulness, respect, and sensitivity; privacy and confidentiality; and timeliness, convenience, and reduced travel. Each of the four studies (Hassija and Gray, 2011; Holyk et al., 2017); Morland et al., 2015; Nazareth et al., 2013) emphasised technology, addressing specifically sound and video quality.

While high levels of satisfaction were reported, the lack of consistency and validation of the surveys limits generalizability of the findings. In addition, the *overall quality* of TM satisfaction was often used as a general measure. For example, the question 'were you satisfied with the overall communication?' is inconsequential without first understanding what it is meant by communication. This could mean 'was the communication clear?' or 'was the communication respectful?' As a result, outcome measurements related to acceptability were open to interpretation. This view is upheld by Le Rouge et al. (2015), Scott et al. (2007), and Whitten and Love (2015) who each examined the satisfaction literature and concluded that many of the studies reporting TM satisfaction displayed methodological flaws related to poor design and data collection tools.

Lack of consistency in satisfaction surveys also presents another problem. Two surveys (Morland et al., 2015; Nazareth et al., 2013) focused on technical aspects and failed to address professionalism of the encounter (e.g. cultural safety). Patients may have been satisfied with the sound and video quality of the equipment but feeling cultural safety was not identified. If TM is not providing a culturally safe environment, then does it matter that the patient saved time and money due to less travel? This identifies that perhaps not all aspects of TM satisfaction should be

weighted equally. This view is well-supported by Holyk et al. (2017) who examined TM satisfaction through an equity-oriented lens.

Holyk et al.'s (2017) survey emphasized not only satisfaction as a broad outcome (as noted in Table 12) but also focused on more specific areas of satisfaction such as relationshipbased care. Holyk et al.'s (2017) survey measured levels of medical trust and attached verses unattached patients with in-person and TM services. Study results suggested that there was no statistically significant difference (p=0.26) with the use of TM on a patient's level of medical trust verses patients who access only face-to-face visits (Holyk et al., 2017). The authors demonstrated evidence of a clear measurable outcome specific to TM care.

Further, results in Holyk et al. (2017) reported statistically significant differences between patients accessing TM at their primary care home verses patients accessing TM on a walk-in basis. The results indicated that patients who accessed TM care with their primary care home were more likely to give a high rating of the service related to the following (Holyk et al., 2017): satisfaction (p=0.01); effectiveness (p<0.001); convenience (p<0.001); usability (p=0.017). Of note, sample questions were not provided in the published article which limits TM programs from applying these findings in similar circumstances. Without first understanding what the user expectations were regarding satisfaction, effectiveness, convenience, and usability, results will not be able to guide future TM programs.

Thus, while findings of patient satisfaction were extremely high in all four studies (Hassija and Gray, 2011; Holyk et al., 2017); Morland et al., 2015; Nazareth et al., 2013), greater than 90% on the majority of questions, results need to be interpreted with caution due to the lack of consistency within the surveys related to the technical and social aspects of TM satisfaction.

Access. Access refers to the "timely receipt of appropriate care, or the ease or difficulty in obtaining care, or the availability of the right care at the right time without undue burden" (Scott et al., 2007, p. S2:6). In this review 11 studies reported that TM improved access to services for populations in rural settings. The most commonly identified outcome indicators for measuring access fell under the auspices of time, travel, and distance (geographical barriers) which was perceived by patients that TM provided a more convenient service. This was supported by previous research outlining measurable indicators of access (NIFTE, 2002; Scott et al., 2007):

- Time timeliness or time to access services; turn-around time or waiting time; lost time at work; travel time; or time spent away from home
- Travel and Distance decreased travel or decreased distance; or decreased distance and a concomitant decrease in time.

In the relevant studies, access was often addressed as other outcome indicators (e.g. time, travel, distance, and convenience were measured in satisfaction surveys). Although useful indicators of patient perceived benefits, this does not provide adequate evidence that TM improves access. Three studies (Grindlay et al., 2013; Hassija and Gray, 2011; Wyatt et al., 2013) reported TM provided more timely access to services but data on the precise times was not available. In one study (Grindlay et al., 2013) participants perceived TM prevented lost time from work but no actual times were recorded. In contrast, two studies provided a more detailed account of improved access via TM: Jhaveri et al. (2016) provided details of shorter wait times for TM visits (10-15 minutes) compared to one hour with a face-to-face visit; and in Ohl et al., 2013 travel time was decreased by 150 minutes from 320 minutes per patient pre-TM to 170 minutes post-TM p<0.001. The number of patients that benefited from this was not reported in either

study. Overall, five studies (Holyk et al., 2017; Jhaveri et al., 2016; Nazareth et al. 2013; Ross et al., 2016; Wyatt et al., 2013) reported decreased travel based on varying degrees of distance from the providing and/or receiving sites as noted in Table 13.

In most cases, it is assumed that TM improves access by mitigating the geographical barriers associated with delivery of health care services for rural populations. Although this is most likely the case, the evidence in this review does not fully support this. Generic or vague descriptions of rurality prevent being able to precisely determine how access was improved. This is relevant in various rural contexts, including the proximity of communities to services where transportation is dependent on road conditions or by plane access only and for places like northern BC where inclement weather changes can pose serious threats to access regardless of transportation or distance (Ministry of Health, 2015). Therefore, identifying a common benchmark for understanding rurality is important; thus, du Plessis et al.'s (2002) Canadian benchmark rural and small town definition will be used to identity the degree of rurality in the relevant studies and will be presented next.

Rural settings. In all 11 studies the idea of access was a common thread fundamental to quality, access, and acceptability of TM services. However, few of the studies were designed to sufficiently address the question of access and none provided a full definition of rural that included Canada's rural and small town benchmark definition (du Plessis et al. 2002). Because the particular focus of interest in this review was on rural access to services, close attention was paid to how the researchers alerted readers to the depth and context of rurality. Within this category – distance, geographic proximity to services, and population data was identified. Accordingly, four descriptions of rural emerged: 1) not rural (Morland et al., 2010; Morland et al. 2015); 2) some attempt at defining distance (Grindlay et al., 2013; Hassija & Gray, 2011; Hitt

et al., 2013; Nazareth et al., 2013; Ohl et al., 2013); 3) proximity to services (Ross et al., 2016;

Wyatt et al., 2013); and 4) proximity to services and population density (Jhaveri et al., 2016;

Holyk et al., 2017). The results of this analysis are displayed in Table 13.

Table 13. Rural Descriptions

Not rural	Some attempt	Proximity to services	Proximity to services
	(Distance)	(Distance)	& population size
PS & RS located at	400mi round-trip ³	52-351km from PS &	RS 112, 202, 438km
same tertiary center ^{1,2}		8-80km from RS ⁸	from PS with
	300-6430km round-		populations 4800,
	trip ⁴	RS greater than	$10,500 \& 8300^{10}$
		280km from PS ⁹	
	A few hours away ⁵		11 RS over 76,000
			sq. km with
	Decreased travel time		populations 100-
	by 150min/year ⁶		1500 ¹¹
	Areas designated as		
	rural ⁷		

PS – Providing site; RS – Receiving site

¹ Morland et al. (2010); ² Morland et al. (2015); ³ Grindlay et al. (2013); ⁴ Hassija & Gray (2011) ⁵ Nazareth et al. (2013); ⁶ Ohl et al. (2013); ⁷ Hitt et al. (2013); ⁸Wyatt et al. (2013); ⁹ Ross et al. (2016); ¹⁰ Jhaveri et al. (2016); ¹¹ Holyk et al. (2017)

Table 13 presents variable descriptions of the rural settings found in the relevant studies. Only one study (Jhaveri et al., 2016) provided enough information to resemble the rural benchmark (du Plessis et al., 2002); the proximity of services (from receiving site to providing site) was 112, 202, and 438km with population sizes of 4800, 10,500, and 8300, respectively (Jhaveri et al., 2016). While distance and population size are good starting points, the degree of integration communities have with larger urban centers is needed to fully understand "rurality" as it relates to individual communities (du Plessis et al., 2002). For example, there are several confounding factors associated with rurality, with the most common being availability of primary care providers and support services as well as the amount of travel time required to access services (e.g. road and weather conditions).

Holyk et al. (2017) and Ross et al. (2016) included detailed descriptions of the confounding factors affecting health care services in their respective communities: services were available to communities three to four days every six to eight weeks in Ross et al. (2016) and by flying in one day a month to provide primary care services in Holyk et al. (2017). However, it is important to note that primary care services are not only provided by physicians, despite a lack of reporting in the studies. Many rural areas in BC employ remote certified registered nurses that offer primary care services; which reinforces the lack of attention in research towards rural primary care, including nurses. Another example of a confounding factor that was not considered within a rural context was identified in Wyatt et al. (2013); it was discovered after implementation that support services for TM delivery included wider systems such as laboratory capabilities at the receiving site. A lack of knowledge about the availability of support services in varied rural communities led to disruptions in care. This enforces the importance of understanding the effects of rurality as it relates to the availability of health care services in each jurisdiction. As discussed earlier, only one study (Ohl et al., 2013) measured the degree of access to include the amount of travel time to access services. Therefore, it was not possible to conclude how efficient and effective TM was at improving rural access to services when rurality was not adequately defined as determined by Canada's benchmark (du Plessis et al., 2002).

Another important consideration for understanding rural settings other than by geographical classifications is equity of access (Browne et al., 2015; Scott et al., 2007). Although distance and equity are often related, equity of services involves a deeper understanding of the social inequalities that exist not only between rural and urban populations, but it acknowledges the differences among rural populations that affect access such as age, gender, financial status, ethnicity, and many others. Equity of access was addressed in Holyk et al.'s (2017) study where maintaining medical trust between TM providers and those that have been negatively impacted by colonization was considered a high priority. The NTOIP agrees that equity of access must also be considered (Scott et al., 2007). This is verified in the literature where the majority of studies clearly indicated that many of the patients treated through TM would not have been able to access care due to their isolated geographical location and their vulnerable social representation (Hassija and Gray, 2011; Hitt et al., 2013; Holyk et al., 2017; Morland et al., 2015; Nazareth et al., 2013; Ross et al., 2016). This is further emphasised in Hitt et al.'s (2013) study where 61% of women (out of 1,298) reported that without the TM program they would have waited for at least 12 months or not sought care at all. This group also made up 60% of the women with high-grade squamous lesion biopsies (Hitt et al., 2013). Pregnant women with OUD cannot and should not have to wait 12 months or longer or not seek care at all due to geographical proximity and uneven distribution of quality health care services.

Overall, the findings suggest that access to health care services implies that some people have access while others do not. TM is a way of bridging this gap; however, none of the studies could adequately define rural to the degree that demonstrated TM improved rural access to services. Further, understanding the geographic proximity to services is important for the population of interest in this review given the prescribing, dispensing, and support services required to deliver OAT in rural communities. Therefore, this discussion will move forward to evaluate the last key element of TM care – human resources.

Human resources. Human resources refers to the need of organizations providing TM services to have a "human resource plan to ensure the right supply and mix of appropriately trained staff, based on needs of the program" (NIFTE, 2003). This view is upheld by BC's Health Charter (2007). Therefore, each study was evaluated for the health care provider
composition at both the receiving site and the providing site. Given the central focus of this review, it is imperative to identify the type and skill mix representative of the TM providers in order to ensure that they possess the necessary competencies for the safe provision of quality health services (CRNBC, 2015; NIFTE, 2003).

In five of the 11 studies (Hitt et al., 2013; Jhaveri et al., 2016; Nazareth et al., 2013; Ohl et al., 2013; Ross et al., 2016) the type and mix of health care professional roles at both the providing and receiving sites were identified; all included health professionals from at least four disciplinary backgrounds – specialists, general practitioners (GPs), nurse practitioners (NPs), pharmacists, registered nurses, and licenced practical nurses; all of which represent an interprofessional collaborative approach (CRNBC, 2011). Although the above studies provided enough information to determine that an interprofessional collaborative approach to primary care services is appropriate for TM-based care, the majority of the studies were of poor quality; thus results must be interpreted with caution. The remaining six studies (Grindlay et al., 2013; Hassija & Gray, 2011; Holyk et al., 2017; Morland et al., 2010; Morland et al., 2015) lacked clarity on provider roles and included no data for the receiving sites. This suggests a considerable gap in the literature in regards to identification of rural providers and communication between rural and tertiary providers. The implications of this are far reaching, particularly if guidelines have to be altered, or for OUD in pregnancy, scope of practice may need to be considered. Thus, understanding and planning of appropriate human resources for TM programs aimed at delivering care to vulnerable populations living in rural communities is critical to providing accessible, quality safe care.

Summary of Quality and Quantity of Evidence

Thus far, a quality appraisal of the relevant literature was conducted followed by a critical analysis of the four key elements known to affect TM care. Table 14 represents the findings associated with the quality and quantity of the evidence in light of TM capacity to deliver care that is at least equivalent to the standards expected in traditional health care delivery.

Element	Outcomes	Quantity of	Quality of	Findings
		Studies	Evidence	
CPGs	Clinical Practice Guidelines	9	3 poor 1 good 5 high	Moderate evidence TM meets standards
	CPG modifications	6	3 poor 1 good 2 high	Poor to moderate evidence TM meets standards
	Safety modifications	5	2 poor 1 good 2 high	Poor to moderate evidence TM meets standards
Clinical	Quality: Health status			
Outcomes	Response to treatment	2	2 poor	Weak evidence TM meets standards
	PROs	3	1 good 2 high	Strong to moderate evidence TM meets standards
	<i>Acceptability:</i> TM satisfaction	4	1 poor 2 good 1 high	Weak evidence TM meets standards
	<i>Access:</i> Utilization of services	2	1 poor 1high	Weak evidence TM meets standards
Rural Settings	Benchmark definition	0	N/A	Weak evidence TM meets standards
Human	Skill and mix of TM	5	4 poor	Weak evidence TM meets
Resources	providers		1 high	standards

Table 14. Quality and Quantity of Evidence

As noted by Table 14, the quality and quantity of evidence was inconsistent across the studies when compared to CPGs, clinical outcomes, rural settings, and human resources. Findings show that three studies (Hassija and Gray, 2011; Morland et al., 2010; Morland et al., 2015) provided enough evidence to demonstrate that TM can provide comparable outcomes to in-person care for improving the health status of patients with mental health disorders. Although moderate evidence was found for the use of appropriate CPGs, the modifications to ensure safe care did not meet the same standards. Where elements of TM care existed, methodological flaws and poor data collection methods contributed to weak evidence. The findings also revealed that the use of relevant outcome indicators was lacking despite existing TM guidelines. Further, no current benchmark exists for either rural settings or health care providers for the delivery of TM services. All 11 studies did not specifically or sufficiently address the issue of access within a rural context. Overall, the studies analysed in this review did not provide enough quality evidence to support that TM meets the same standards of care as face-to-face. Therefore, it is difficult to identify whether TM can help meet needs of rural pregnant women in BC with OUD and to what extent TM could provide effective and efficient care in a rural context.

Northern BC's vast geography and dispersed populations introduces unique challenges that must be addressed with flexible and innovative ways of delivering health care services specific for rural populations (BC Ministry of Health, 2015). Currently, in BC there is a lack of guidance regarding a process for clearly defining a solid and consistent foundation to which all involved in TM can refer. This view is upheld by the studies in this review. To achieve a better understanding of the complex nature of TM, research may have to take a step back and return to the development stages. The MRC's (2006) framework for complex interventions states that in many cases, the development phase (identifying the evidence-base, identifying theory, and modeling process and outcomes) has been bypassed in TM and researchers have launched into exploratory or pilot trials and RCTs, without sufficient preparation. This may, in part be a major contributing factor as to the methodological weaknesses in current TM research that is applicable in a rural BC context. Thus, returning to examine the requirements of the development phase, and assessing community readiness for TM services may be where TM research needs to be further evaluated. Therefore, the next section will analyse the level of TM readiness outlined in the studies included in this review.

TM Readiness

This section will begin with a critical analysis of the relevant studies to answer the second sub-question: Is community readiness (patient, provider, and organizational) an influencing factor for TM implementation? Before embarking on an initiative such as TM, there must be a reasonable probability that the intervention would be beneficial to service users, namely rural residents. Research has been focused on the benefits of TM (convenience, travel, and cost), which is often associated with high levels of patient satisfaction and promises of extending the reach of health care providers to improve access. In a recent systematic review on TM and patient satisfaction, Kruse et al. (2017) strongly advised that TM should not be without deliberate design and that attention is needed to safe-guard against the implementation of TM merely for its convenience. In repeated studies looking at TM implementation, readiness has shown to be a preliminary factor for success and sustainability (Jennett, Gagnon, & Bradford, 2005; Information Technologies Group, 2002). Readiness for change "considers the capacity for making change and the extent to which individuals perceive the change as needed" (Jennett et al., 2005).

The purpose of this section is to examine and analyse the studies to identify the factors influencing patient, practitioner, and organizational readiness using Jennett et al.'s (2003) TM readiness framework (Appendix D). Five themes emerged from the literature that influenced the degree of TM readiness for patients, providers, and organizations: 1) desire for change; 2) TM awareness and education; 3) TM integration; 4) communication between domains; and 5) community consultation and needs assessment. These five themes will be discussed as they relate to Jennett et al.'s (2003) framework of core readiness, engagement, structural readiness, and non-readiness.

Core readiness. Core readiness refers to the "genuine need for telehealth services (usually based on conditions caused by isolation) and a felt or expressed dissatisfaction with services" (Jennett et al., 2003). The overarching theme emerging from the studies was the importance of choice for patients between modalities – TM or face-to-face. For patients, choice was important because it signals a desire for change and a willingness to help themselves (Jennett et al., 2003). Providing choice also puts patient-centered care at the forefront (Institute of Medicine, 2001). Six studies offered patients a choice between TM and face-to-face (Grindlay et al., 2013; Hitt et al., 2013; Holyk et al., 2017; Nazareth et al., 2013; Ohl et al., 2013; Ross et al., 2016).

When given a choice, the majority of patients chose TM rather than face-to-face. In Ohl et al. (2013) 30 out of 32 patients chose TM with only two preferring to travel. In two studies (Grindlay et al., 2013; Nazareth et al., 2013) all participants chose TM. For three studies (Hitt et al., 2013; Holyk et al., 2017; Ross et al., 2016) the total number of participants that chose face-to-face were not reported. However, nearly 1,300 participants in Hitt et al.'s (2013) study chose TM; it was not clear if the remaining 200 preferred face-to-face or were lost to follow-up or that

they did not require colposcopy services. For two other studies (Holyk et al., 2017; Ross et al., 2016), permitting sufficient time for patients to become familiar with the modality may increase the likelihood of choosing TM services. Ross et al.'s (2016) study reported 280 TM visits were available and only 60 visits were utilized in the study's short duration, however the number of visits did increase each month showing a growing interest in the modality. This trend was also reported in Holyk et al. (2017). Both studies (Holyk et al., 2017; Ross et al., 2016) supported in-person visits with TM to provide care for at-risk Canadian populations.

For patients, the most common reasons cited in the literature for choosing TM were convenience, less costs associated with travel, and faster access to care (Grindlay et al., 2013; Nazareth et al., 2013; Ohl et al., 2013; Wyatt et al., 2013). One interviewee reported feeling nervous about TM, but said it was more important for her to go to the closest clinic (Grindlay et al., 2013). Multiple participants in Ohl et al. (2013) reported that "travel burdens often made it difficult to obtain care . . ." (p. 1166). Likewise in Wyatt et al. (2013), interviewees emphasized "the process was faster" and there was "less money spent on gas" (p. 496). In Nazareth et al. (2013), a satisfaction survey revealed the majority of patients believed TM saved them money, time, and stress.

For TM providers, core readiness was most notably recognized as "extreme dissatisfaction with the status quo" (Jennett et al., 2003). Isolation, disparate services, provider shortages, and inequitable access to services were contributing factors of readiness for health care professionals in eight studies (Grindlay et al., 2013; Hassija & Gray, 2011; Holyk et al., 2017; Jhaveri et al., 2016; Nazareth et al., 2013; Ohl et al., 2013; Ross et al., 2016; Wyatt et al., 2013). In Holyk et al. (2017) and Ross et al. (2016), health care providers were dissatisfied with the lack of primary care between in-person visits which caused many patients to travel for care.

Offering TM between visits was a way of providing continuity of care where the same providers could deliver care to their patients at a distance. (Holyk et al., 2017; Ross et al., 2016). Having a first-hand understanding of the negative effects of isolation is also an important consideration for TM provider core readiness (Jennett et al., 2003).

A significant finding in Ohl et al.'s (2013) study was that the need to address the problem of access was determined by both TM providers and patients during a needs assessment prior to TM implementation. In Jennett et al.'s (2002) earlier work, it was suggested that readiness and a willingness to try was just as important for providers as it was for patients. The lack of TM provider input from the rural receiving sites was a noticeable gap in the literature. In the only study to include the experiences of rural providers (Jhaveri et al., 2016), the expanded scope of practice associated with TM services was considered a benefit, however the six rural RNs expressed a need for more in-depth training. If rural users are not satisfied with the service or are unwilling to use it, the TM application will be unsustainable.

Engagement. Engagement refers to a process in which people actively participate in the idea of TM, weighing the advantages and disadvantages (Jennett et al., 2003). This process was most obvious in patients, where they were aware of the negative effects of isolation, but lacked basic knowledge on how TM is expected to function. Since TM involves communication between multiple organizations, "a good working relationship between the providing and receiving sites is required" (Jennett et al., 2003, p. 29). In four studies (Grindlay et al., 2013; Ohl et al., 2013; Nazareth et al., 2013; Wyatt et al., 2013) a lack of TM preparation was an important factor contributing to a state of non-readiness for TM innovations. Many participants in Wyatt et al. (2013) reported having no TM preparation including that there would be cameras and multiple people in the room. One interviewee reported "it wasn't just like one-on-one with the

doctor, I had two or three people watching me . . . " (Wyatt et al., 2013, p. 495). As a result of the study, changes to the TM program were implemented (Wyatt et al., 2013): Communication was improved between sites (receiving sites were better informed of the expectations of a TM visit) and patients were given an information package explaining exactly how TM was expected to function (Wyatt et al., 2013). This process of actively engaging patients in weighing the advantages and disadvantages of TM led to positive program changes and most likely increased readiness (Jennett et al., 2003). When patients become active participants in their health, they are more likely to have a sense of ownership and ownership promotes buy-in of services (Jennett et al., 2003). Of note, the TM program has been operational for more than 10 years which indicates that patient engagement is a fluid process that requires on-going assessment as new patients enter the program.

Participants in Nazareth et al. (2013) experienced similar concerns of loss of privacy and the unexpected number of people during the encounter which indicated they were not wellinformed of the expectations of a TM visit. This was validated in two other studies (Ohl et al., 2013; Ross et al., 2016) where there was a clear need to provide patients with reassurance that their privacy would be protected. Participants in Ohl et al. (2013) expressed interest in using the TM program provided that they felt secure that their privacy would be maintained. Likewise, in Ross et al. (2016) the authors reported that once providers prepared patients for a TM visit (e.g. explained equipment does not record, nor does the patient's image get copied) patients became more open and talkative (Ross et al., 2016).

The desire for privacy related to a sensitive health condition was a major concern for several participants in Grindlay et al. (2013). Participants reported choosing TM services because it provided anonymity from the anticipated stigma related to abortion. Being able to receive care

in their community (opposed to traveling) avoided having to explain their reasons for travel and time off work. However, during a TM visit one participant expressed privacy concerns and stated ". . . the nurse told me that it was just me and her [the doctor], that nobody else, its's not broadcast or anything, so that made me feel like privacy was ok" (Grindlay et al., 2013, p. e120). Overall, the literature has demonstrated an increased need for TM awareness and education for patients prior to a TM visit, especially where privacy is concerned. Jennett et al. (2003) reported that a "genuine understanding of telehealth (understanding the various applications, their potential benefits and limitations) was linked to a readiness to adopt" (p. 261). On the other hand, a lack of understanding can lead to patients feeling more vulnerable, thus putting them at even greater risk of not receiving appropriate care.

A lack of communication, particularly between health care professionals at the providing and receiving sites, also resulted in patients experiencing ambiguity about provider roles. In Ohl et al. (2013) patients described role confusion between providers at the different sites in regards to who should respond to more urgent health concerns. Despite having a TM framework outlining health care professional roles, this was still problematic which suggests that communication between organizations and providers also needs attention. Inter-group dynamics and cooperation between these groups was found to play a major role in readiness (Jennett et al., 2003). However, 50 percent of the TM studies in this review did not identify the TM providers at the receiving sites, precluding further analyses of this group (Grindlay et al., 2013; Hassija and Gray, 2011; Holyk et al., 2017; Morland et al., 2010; Morland et al., 2015; Wyatt et al., 2013). These findings suggest that typically rural providers have not been involved with TM program development. This seems to be a significant gap in the literature. On the other hand, the need for supportive and effective communication was highly recognised in four studies (Hassija and Gray, 2011; Holyk et al., 2017; Jhaveri et al., 2016; Ross et al., 2016). Building relationships based on trust and rapport with patients was a priority for TM providers in Hassija and Gray (2011), Holyk et al. (2017) and Ross et al. (2016). This was accomplished by dedicating the first TM visit explaining expectations, security of the system, privacy and relationship building. Of note, all three studies included vulnerable populations (rural First Nations and domestic violence/rape victims) that may require a higher degree of trust; not unlike the population of interest in this review. The need for effective supportive communication was also emphasized in Jhaveri et al. (2016): Specialists commented on the "pivotal role" of tertiary nurses in the development of the model; rural nurses felt "adequately supported" by the providing site staff and described, "the communication has been excellent"; and tertiary nurses felt the specialists were "very approachable." This was also the only study to include the views of providers at the TM receiving sites.

Structural readiness. Structural readiness focuses on building adequate infrastructure (human resources, training, and technical) as a foundation for successful implementation (Jennett, et al., 2003). Structural readiness also includes ensuring TM services become integrated into existing services (Jennett et al., 2005). For seven out of the 11 studies (Grindlay et al., 2013; Hassija & Gray, 2011; Holyk et al., 2017; Jhaveri et al., 2016; Ohl et al., 2013; Ross et al., 2016; Wyatt et al., 2013) TM was built into existing health care systems. In all cases, the forming of partnerships with other agencies was fundamental for acquiring adequate facilities and equipment and to off-set the costs associated with implementation. As well, operations continued in each program after study completion with Hassija and Gray (2011) continuing on to a randomized control trial and Ross et al. (2016) expanding their pilot to two additional sites. In

three of the studies (Hitt et al., 2013; Morland et al., 2010; Morland et al., 2015) the TM program was created for study purposes and in all three cases operations ceased after study completion. It was clear that integrating TM into existing services provided a good foundation for program sustainability for the majority of the studies.

Although implementing TM into existing services was clear, the organizational structure of the services was not. Five studies (Holyk et al., 2017; Jhaveri et al., 2016; Nazareth et al., 2013; Ohl et al., 2013; Ross et al., 2016) described a blend of in-person and TM services. Two Canadian studies (Holyk et al., 2017; Ross et al., 2016) concluded that TM be a supplement to in-person services and not a replacement. Ross et al. (2016) reported that staff were more supportive once the project's purpose was revealed in that, TM would "provide an adjunct to primary care, while not replacing in-person care" (p. 64). Likewise, in Holyk et al. (2017) TM was introduced to offer a blend of in-person visits supported by TM when the physicians were not in the community with the goal of determining "the desired effect of improving access to care without impacting the quality of care provided" (p. 17). This is to ensure that TM remains a quality supplement to in-person care rather than a replacement.

Three other studies (Jhaveri et al., 2016; Nazareth et al., 2013; Ohl et al., 2013) described similar program elements that used a blend of in-person and TM services to support the needs of rural residents. Jhaveri et al.'s (2016) blended service model included one face-to-face visit (for the initial medication dose) followed by subsequent TM visits and Ohl et al.'s (2013) was a blend of TM and face-to-face for each visit; in both cases the blended model of care was designed in the planning stages prior to TM implementation based on the needs of patients and providers. However, Nazareth et al.'s (2013) study was unclear why patients needed a blend of

services but alluded to the expectation that future patients will seldom be required to travel, as the majority of care can occur via TM.

One of the first steps in the successful implementation of TM services is planning. A well conducted needs assessment is a critical component of organizational readiness (Jennett et al., 2003). Only two studies reported meeting this requirement (Jhaveri et al., 2016; Ohl et al., 2013) with sufficient details. A third study (Ross et al., 2016) reported that most (12 out of 14) TM providers felt they had enough input into the planning of the program and were interested in continuing with TM services, however the authors did not provide enough details on the extent of the needs assessment, thus conclusions could not be drawn. In contrast, Jhaveri et al. (2016) reported that a number of requirements were met prior to the development of a TM model of chemotherapy treatment. Structural readiness requirements included workforce, governance, training, information technology, selection of patients and treatment regimens, and documentation (Jhaveri et al., 2013). Ohl et al. (2013) was the only study in this review to obtain a thorough needs assessment prior to implementation of a TM model of care. TM program planning was initiated one year prior to implementation and included both provider and patient input towards the delivery of services. Patients were engaged in discussions on how TM would meet their needs and additional discussions with providers focussed on establishing necessary components of a TM framework that would meet the needs of their client population, including 1) clear definition of roles for the primary care and speciality teams; 2) process to coordinate care across sites; and 3) systems to manage care across multiple sites (Ohl et al., 2013). Each component was accompanied by a thorough description.

Summary of TM Readiness

Findings from this review demonstrate several critical factors affecting TM readiness across all domains (patients, providers, and organizations): 1) desire for change; 2) TM awareness and education; 3) TM integration; 4) communication between domains; and 5) community consultation and needs assessment. Based on the relevant studies, Table 15 illustrates whether patients, providers, and organizations were ready or non-ready for TM innovations. *Table 15. Factors Affecting TM Readiness*

Types of readiness	Patient	TM provider	Organization
Core readiness	Recognition of unmet needs, sense of isolation Desire for change Willingness to try TM (ready)	Dissatisfaction with the status quo Driving need to address the problem (ready)	Recognition of unaddressed needs (ready)
Engagement	Awareness about the benefits/risks of TM (ready) Knowledge about what exactly TM is (non-ready)	Communication between domains (non-ready)	Established mechanisms of knowledge transfer between staff (non-ready)
Structural readiness	Education about TM, Sense of ownership, Awareness of TM; overcoming sense of vulnerability (non-ready)	Reliable education Addressing Rural provider concerns (workload, reimbursement) (non-ready)	TM integration into existing systems (ready) Adequate facilities/equipment (ready) Assessing needs/ community consultation (non- ready)

Bolded indicates degree of readiness for TM

As noted in Table 15, it is evident that all domains (patients, providers, and organizations) have a clear understanding of the negative effects of isolation. This understanding, in turn, promotes a desire for change and a willingness to try TM. However, it was also evident that patients,

providers, and organizations did not have adequate knowledge or education on TM which resulted in poor communication. In turn, poor communication contributed to an overwhelming sense of vulnerability in regards to patient privacy, as well as misconceptions of TM being implemented as a replacement to in-person services.

In the majority of studies, structural readiness commonly occurred at the organizational level that included integration of TM into existing services and adequate facilities and equipment. However, instances of organizational non-readiness were evident by the lack of program planning prior to TM implementation. Without sufficient preparation (community consultation and a well-conducted needs assessment), the target population and their health care needs, how these needs can be met, and why TM is the most appropriate modality for meeting these needs, could not be fully understood (Jennett et al., 2003). Further, due to the lack of input from rural providers, important factors affecting readiness such as addressing workloads, reimbursement, and adequate education were not evaluated. Therefore, based on Jennett et al.'s (2003) framework, the majority of studies in this review did not appear to be completely ready or fully prepared for TM innovations.

Overall Summary of Findings

This review provided an opportunity to offer an integrative way to draw together various methodological studies on the use of TM. A critical analyses of the 11 papers found that while individual studies may have aspects of quality results, overall the findings demonstrate that TM, for the most part, lacks quality evidence to support its use. The findings from this review mirror those from recent systematic reviews (Ekeland et al., 2010; Flodgren et al., 2015; McLean et al., 2011). There are several possible explanations for these findings. Firstly, poor methodological quality and data collection methods of the studies contributed to weak evidence as demonstrated

in Tables 7 and 14. In particular, valid, reliable, and measurable clinical standards and outcomes were poorly executed in the majority of the studies despite existing national and international TM guidelines.

Secondly, and perhaps the most striking, the findings from this review demonstrate a lack of attention towards the development phase of designing, implementation, and evaluating TM applications. In only two of the studies reviewed, were considerations and findings guided and presented within a framework (Jhaveri et al., 2016; Ohl et al., 2013) and only one of those studies (Ohl et al., 2013) conducted a needs assessment that involved all stakeholders (providing and receiving sites, practitioners, and patients). The use of a framework, including a needs assessment, enables an approach that acknowledges the specific needs of patients and health care professionals. The magnitude of this challenge becomes more acute when we recognize the different levels of support required for individual rural communities – from larger communities that have primary care providers, laboratory, pharmacy, and other support service capabilities, to smaller more remote communities that are unable to sustain such services. In other words, TM is not a *one size fits all* approach. Rather, it requires some tailoring to meet the needs of the end users, most notably rural patients.

Overall, the studies analyzed in this review did not provide enough quality evidence to determine whether TM can help meet the needs of rural pregnant women in BC with OUD and to what extent TM could provide effective and efficient care in a rural context. However, this does not necessarily mean that TM should not be used as a means to increase access to OAT services for rural pregnant women, rather the findings from this review indicate a further need to understand the fundamental elements of designing, implementing, and evaluating successful TM applications. This is significant because not only do NPs have the legislative authority to provide

interprofessional collaborative care for pregnant women with OUD, they also possess the knowledge of health care policy reform, community development, and health program planning that provides them with the tools to directly address vulnerable populations in BC that are systemically disadvantaged.

Part of the graduate level of education for NPs includes the development of skills needed to research, critically appraise, and apply the literature related to clinical practice issues such as the delivery of health care services via TM. The NP is also expected to seek out opportunities to conduct or participate in research and to initiate the development of policy, practice guidelines, and standards of care (CRNBC, 2015). Therefore, potential strategies based on the findings from this review, to address how NPs can deliver TM-based care to pregnant women with OUD, will be discussed in the context of macro, meso, and micro-levels of health care systems followed by recommendations for practice.

Chapter Five

Discussion

The catalyst for this integrative literature review was the necessity to identify strategies for NPs and other primary care providers to address BC's opioid crisis in the context of rural pregnant women. Specifically, this review focused on the capabilities of TM to deliver OAT services. While TM is generally viewed as an option to improve access to geographically dispersed communities, the link between the five key elements (CPGs, clinical outcomes, rural settings, human resources, and community readiness) have not been explicitly discussed and successfully implemented in the TM literature. In the context of macro, meso, and micro-levels of health care systems, NPs may be able to garner an improved understanding of these key elements and therefore provide the evidence needed to inform the use of TM applications for managing OUD in pregnant women living in rural BC.

Macro, meso, and micro-levels refer to the policy level, the organizational and community level, and the patient interaction level, respectively (WHO, 2015). When these three levels "work effectively within themselves and successfully function in relation to each other, health care is efficient and effective; patients experience better health" (WHO, 2002, p. 31). Each of the findings of this review provided direction for making recommendations at the policy, organizational, and patient level of health care service delivery. Following the discussion, Table 16 outlines key recommendations and suggestions for implementation are offered.

Macro: System-Level – Health Care Policy

Contrary to expectations, this review did not find enough quality evidence to suggest that TM provides comparable services to in-person care. What is curious about this result is that all 11 studies strongly reported otherwise. These differences can be explained in part by the considerable quantity of data focused on "improving access" to support the successful implementation of TM. Although there appears to be general consensus in the literature relating to access, Scott et al. (2007) acknowledges that ". . . access means different things to different stakeholders in the health care system" (p. S2:10). For example, see the article by Levesque, Harris, and Russell (2013) for a summary of the different conceptualizations of access. It may be that participants in the relevant studies benefitted from improved access to services; however, none of the studies could adequately demonstrate these results. This indicates that no formal structured process was used to examine outcome indicators that would be appropriate for evaluating TM services which implies issues at the policy level.

Health systems and technical innovations are rapidly developing and changing. A key macro factor impacting on the uptake of TM has been the lack of consistent policy between the health professions on TM. Identifying the direction TM guidelines and standards should take is the responsibility of the regulatory bodies to ensure policy reflects the nature of the intervention. This is reflected not only in the varied definitions of TM (Appendix C) but it also includes the different modes of delivery, the users, the providers, the location, and the context of the TM interaction. Without consensus at the policy level, health services are likely to be wasteful and fragmented (WHO, 2002) as shown by the lack of evidence for measurable outcomes in TM found in this review.

The recent interprofessional collaborative efforts of the three regulatory bodies in BC (CRNBC, CPSBC, and CPBC) have responded to the opioid crisis by working together to ensure that changes to *NP Scope of Practice* align with the prescribing/dispensing practices for OAT that are held to the same standards of care required of physician and pharmacist colleagues (CRNBC, 2017a). This collaborative move, along with the creation of the BCCSU (2017), has

created a window of opportunity for policy change regarding TM. NPs have the opportunity to influence the formation of TM health policy to better reflect the delivery of health care services in rural BC. Through the literature analysis, the following recommendations at the macro level include:

- Together, the three regulatory bodies, CRNBC, CPSBC, and CPBC will build a unified TM policy that addresses TM in the context of primary care and rural settings.
- CRNBC, CPSBC, and CPBC will determine a broad set of guidelines for individuals and organizations to use a benchmark for TM service provision (e.g. NIFTE and NTOIP).

• Establish TM as part of the education curriculum for physicians, NPs, and pharmacists. At the macro level taking action towards disseminating the findings of this review would offer an opportunity to communicate and interact with wider policy and health service audiences. Presenting the findings of this review at the BCNPA annual conference is one way that may facilitate the knowledge of TM innovations in BC.

Meso: Organizational-Level – Structure of Services

The meso-level is where policy begins to take shape as a specific program (WHO, 2015) such as delivery of OAT services for rural pregnant women in BC. It is at this level where the policy gets negotiated into a program with specific scope and deliverables. This review identified limited evidence of a clear process guiding the design, implementation, and evaluation of TM programs. The findings of this review identify a significant gap in the literature regarding the limitations of translating current research into clinical practice. This indicates a need to further understand the various elements associated with TM: CPGs, clinical outcomes, rural settings, human resources, and community readiness.

Clinical standards and outcomes ". . . must be chosen according to agreed criteria rather than in the prevailing *ad hoc* manner" (Scott et al., 2007, p. S2:2). This view is strongly upheld by two Canadian TM reports (NIFTE, 2003; Scott et al., 2007). Standardization of practice relies on guidelines that inform decision-making towards optimal provision of services while also making clear their appropriate use in a given context (WHO, 2015). Responding to this challenge, primary care providers have the opportunity to bring about the necessary changes to practice by advocating for use of evidence-informed standards and outcomes in the context of TM program development. There was strong evidence from this review to support the need for CPG modifications to help ensure safe delivery of medications via TM (Jhaveri et al., 2016; Nazareth et al., 2013; Wyatt et al., 2013). This is an important finding given the safety concerns of the medications involved for the treatment of OUD in pregnancy.

However, research to date has not been able to provide robust evidence that TM provides similar outcomes to in-person services. These results are likely related to the inconsistent use of outcome indicators measuring the quality, access, and acceptability of TM services. These results mirror those of the previous studies that have examined outcomes in TM research (Le Rouge et al., 2015; NIFTE, 2003; Scott et al., 2007). In considering the specific needs of vulnerable populations including pregnant women with OUD, this has significant implications towards providing effective, efficient, and equitable health care service delivery.

Rural settings and human resources are two other elements important to the development of TM programs in northern BC. TM has been repeatedly described in the literature as a modality for improving access to health care services for rural and remote communities (Romanow, 2002; Scott et al., 2007; WHO, 2010). As the number of TM projects, programs, and services has steadily increased in recent years, minimal attention is being placed on rural communities. A challenge in selecting and analyzing the studies included in the review was defining what it means to be *rural*. Indeed, no accepted definition of rural emerges in the TM literature. This includes knowledge of geographic proximity to services, local supports and services, the skill and mix of health care professionals, and the unique barriers individual communities are facing. The fact that no studies in this review adequately define rural supports this. This list of issues demonstrates the need to revisit and reassess the components within which TM operates, namely rural communities. For northern BC, TM programs must be designed, implemented, and evaluated within a rural context that includes the voices of rural residents and rural providers.

Community readiness is a vital element of TM program development and arguably the most important. Assessment of both community and provider readiness for TM were found to be essential components of a needs assessment (Jennett et al., 2003). Provider and patient readiness necessitates looking at factors including: the community's needs; epidemiological data; the community's health care resources; the skill and mix of health care providers in the community; what is realistic access to services; and what is feasible (Jennett et al., 2003). All of which support the importance of determining the level of rurality for the individual community. Interestingly, only one study (Ohl et al., 2013) reported consulting the community and performing a needs assessment prior to program implementation. The findings of this review suggest that it is possible that the development stages of TM have been bypassed and researchers have launched into implementation and evaluation without sufficient preparation (Craig et al., 2006). This also suggests that a lack of community readiness along with poor change management are responsible for TM not being adopted at the expected rate. Although only

speculative at this time, change management theory may play a more active role within TM and thus deserves further consideration in the future of TM research.

Overall, these findings suggest that there are five key elements of a TM program that need to be addressed at the meso-level to ensure adequate design, implementation, and evaluation of TM programs: CPGs, clinical outcomes, rural settings, human resources, and community readiness. The following recommendation is guided by the findings in this review and has been applied in the context of delivering OAT services for rural pregnant women via TM:

 Establishment of an interprofessional collaborative committee to oversee the development of a TM framework and guidelines specific to the management of OAT in rural pregnant women: Perinatal Services BC, SOGC, Midwifery, NPs, GPs, rural providers, and pharmacy. Focus is on translating current policy towards a workable program. This includes: CPGs, clinical outcomes, rural settings, human resources, and community readiness.

At the meso level, individual NPs might consider taking action by contacting the BCCSU to discuss how current OUD guidelines might be adapted for TM service delivery in rural communities.

Micro: Clinical-Level – Provision of Clinical Services

The micro-level is the integration of policy and guidelines into every-day clinical practice where patients and providers interact in a meaningful way that influences health care outcomes. Two common problems at the micro-level are "the failure to empower patients to improve health outcomes and the lack of emphasis on quality interactions with health care personal" (WHO, 2002, p. 31). TM encounters challenge the traditional face-to-face mode of health care delivery.

For vulnerable populations this challenge has the potential to further limit access to care rather than draw people in. The findings from this review suggest that building trust and rapport and maintaining privacy between patients and providers is key to successful TM interactions. However, building relationships and ensuring quality communication in TM encounters between providers and patients remains poorly understood. This was reflected by the fact that many patients lacked a basic understanding of what TM was and how it was expected to function which highlights the issue of whether patients truly gave informed consent. In order for patients and providers to have meaningful interactions the balance of power needs to shift towards patients so that they can actively participate and take ownership of their health care needs. Therefore, until TM becomes "routine practice" it should follow suit with other medical interventions and informed consent should be fully obtained prior to delivery of the service (Maheu, Whitten, & Allen, 2001).

The findings of this review also suggest that a blend of in-person visits supported by TM not only addresses patient safety but it fosters the building of relationships between patients and providers. Tailoring OAT services to meet the needs of vulnerable women, such as offering choices and easing into health care encounters are high impact ways of recognizing people's vulnerability and moving towards building trust and rapport (Browne et al., 2012) as essential components of TM. This view was upheld by Hassija and Gray (2011), Holyk et al. (2017), and Ross et al. (2016) where permitting sufficient time for patients to become familiar with the modality led to improved access and more meaningful interactions based on trust. Perhaps the most striking finding is the equity-orientated approach in Holyk et al.'s (2017) study that addressed the structural inequities of BC's rural populations through the use of TM. Although this was the only study to provide evidence that TM was capable of delivering culturally safe

services to vulnerable populations, it is arguably the most important finding in this review. This indicates a substantial need to understand the link between health inequities, primary care, and TM in the context of northern BC populations.

Following a correspondence with a leading scholar in the field of TM in BC, Dr. John Pawlovich, a family physician and co-author of the Holyk et al. (2017) study, he strongly believes that TM is designed to be a complementary tool that extends the reach of primary care providers. He states, "The foundation of technology is to support longitudinal care – but it is not the end game" (personal communication, November 19, 2017). Dr. Pawlovich moves on to explain that relationship-based care plays a pivotal role in the provision of health care services for populations that have historically been disadvantaged; thus, providers must continue to intentionally foster trusting relationships while providing care at a distance (personal communication, November 19, 2017). The findings from this review have the potential to build on the recent work of Holyk, Pawlovich, Ross, and Hooper (2017) to include an equity-oriented approach to health care service delivery via TM.

The following recommendations are guided by the findings in this review and represent the key components associated with offering TM-based services that are tailored to empower patients at the micro-level of health care service delivery:

- TM providers create and maintain culturally safe environments with an emphasis on equity-oriented care that fosters quality health care interactions between providers and patients.
- Follow all ethical and legal requirements that relate to patient decision-making and obtain informed consent.

At the micro level individual NPs might consider taking action by developing evidencedbased informed consents and TM satisfaction surveys that consider the historical, cultural, and geographical influences that have affected Indigenous populations in northern BC. This would include consulting individual rural communities for their valuable input as informed and respected stakeholders.

The following Table 16 includes key recommendations for the design, implementation, and evaluation of TM programs at the macro, meso, and micro-level of health care service delivery. With each recommendation suggestions for implementation are offered.

Health Care	Recommendations	Suggestions for Implementation
System		
Level		
Macro	 Together, the three regulatory bodies, CRNBC, CPSBC, and CPBC will build a unified TM policy that addresses TM in the context of primary care and rural settings. 	 TM definition: CPSBC (2015) definition To ensure a primary care focus, this review suggests videoconferencing be the primary mode of delivery in TM applications designed for increasing access to services TM is a complimentary tool not a replacement, therefore each patient has the choice to decline participation Rural setting definition: To ensure the optimal use of TM services in BC, PCPs who use TM have knowledge about the level of rurality in the community where they are providing the service (e.g. geographical proximity to services, availability of health care providers and support services in the community). This review suggests du Plessis et al.'s (2002) benchmark definition. Equity-oriented provision of services: Follow all ethical and legal requirements to providing culturally relevant care that includes building relationships and eliminating existing inequities. TM providers have a professional responsibility to provide robust evaluation of services that include monitoring quality and outcomes of TM applications to improve services for patients and providers

Table 16. Key Recommendations for TM Design, Implementation, and Evaluation.

Health Care	Recommendations	Suggestions for Implementation
System		
Level		
Macro	 CRNBC, CPSBC, and CPBC will determine a broad set of guidelines for individuals and organizations to use as a benchmark for TM service provision to which all involved with TM can refer 	 The following guidelines and frameworks are suggested to be used as a point of reference towards the development of more specific TM programs: National Initiative for Telehealth Framework of Guidelines (NIFTE, 2003) National Telehealth Outcome Indicators Project NTOIP (Scott et al., 2007) Jennett et al.'s (2003) framework for investigating the readiness of rural and remote communities for TM
	3. Establish TM as part of the education curriculum for physicians, NPs, and pharmacists.	 Education on TM policy as indicated above with a focus on interprofessional collaboration and patient education. TM demonstrations Practicums to include TM-based care
Meso	 Establishment of an interprofessional collaborative committee to oversee the development of TM guidelines specific to the management of OAT for pregnant women in a rural context 	 Committee members to include: SOGC Perinatal Services BC Midwifery NPs Obstetricians, GPs, rural providers, social work, and pharmacy Indigenous community representation Focus is on translating current policy towards a workable program in a rural context. This includes: CPGs Clinical outcomes Rural settings Human resources Community readiness.

Health Care	Recommendations	Suggestions for Implementation
System		
Level		
Meso	2. Clinical Practice Guidelines: Prescribing professionals will use current existing CPGs for OAT in pregnant women to guide the delivery of care in the TM setting, recognizing that modifications may need to be made to accommodate specific circumstances (e.g. prescribing, dispensing, and support services)	 The following evidence-informed resources can be considered in the management of pregnant women requiring OAT: The management of opioid use dependence during pregnancy in rural and remote settings (Jumah, Graves & Khan, 2015) No. 349-Substance use in pregnancy SOGC Clinical Practice Guideline (SOGC, 2017) Screening and management of substance use in pregnancy: A review (SOGC, 2017) Epidemiology and effects of substance use in pregnancy (SOGC, 2017) A guideline for the clinical management of opioid use disorder (British Columbia Center on Substance Use, 2017) CPG modifications – Prescribing OUD treatment involves narcotics, therefore safe prescribing practices in a rural context need to be established. In order to provide OAT via TM, PCPs are advised that they are responsible to: not prescribe narcotics to patients whom they have not personally examined or with whom they do not have a longitudinal relationship ensure patients meet the criteria for SUD as per DSM-V ensure both the providing site and receiving site communicate and determine follow-up care, roles and responsibilities of each provider and after-hours care as medically appropriate communicate with providers on managing adverse events and who to contact in an emergency CPG modifications – Dispensing

Health Care	Recommendations	Suggestions for Implementation
System		
Level		
Meso	CPGs continued	 Dispensing practices will vary between communities depending on the level of services. PCPs are responsible for the following: To ensure availability of dispensing services or appropriate alternatives prior to OAT. This includes knowing who will dispense and/or witness doses Determine appropriate protocols for carry privileges in rural and remote areas. This includes availability of safe medication storage (e.g. using a remote lock box) and consideration of the current barriers to obtaining carries (e.g. the difficulties of meeting the 12 week requirement of single dose administration in communities that do not have secure dispensing services). CPG modifications – Support services Support services (laboratory, pharmacy, mental health and counselling, social work services, and providers) will be dependent on the level of services. PCPs are responsible for the following: Identifying the support services in each community and appropriate alternatives where no services exist. This includes identifying the skill and mix of health care professionals. Follow all ethical and legal requirements to providing culturally relevant care that includes building relationships and eliminating existing inequities

Health Care	Recommendations	Suggestions for Implementation
System		
Level		
Meso	3. Clinical Outcomes: Organizations will assist health care providers in the collection, evaluation, and reporting of health care outcome data for TM. Evidence-informed indicators measuring clinical effectiveness and efficiency of TM services will include: Quality, access, acceptability	 Quality: Employ the use of validated tools to evaluate quality Ensure appropriate quality indicators (PROs, RTT, morbidity, and mortality) Access: Assessing patient perceptions of access (barriers to care) Assessing time: timeliness or time to access services; turnaround time or waiting time; lost time at work; travel time; or time spent away from home Assessing travel and distance: decreased travel or decreased distance; or decreased distance and a concomitant decrease in time Acceptability: Employ the use of valid and reliable tools to evaluate satisfaction of TM services for patients and PCPs and to include patient perceptions of: cultural safety, trust, respect
	 4. Rural Settings: Du Plessis et al.'s (2002) benchmark rural definition (rural and small town) will be used to evaluate the rural settings of patients requiring OAT treatment. 5. Human Resources: Consideration of a human resource plan to reflect the complex aspects of TM and OAT services. 	 OAT providers will be responsible for identifying: Geographical proximity to services Population data Local community resources and support services Knowledge of transportation options Rural health care providers Organizations will assist with identifying the right supply and mix of appropriately trained health care professionals at each site (providing and receiving) based on patient need. Interprofessional teams may include: Obstetricians, specialists in addictions, NPs with perinatal experience, GPs, RNs, pharmacy, laboratory, mental
	5. Human Resources: Consideration of a human resource plan to reflect the complex aspects of TM and OAT services.	 Organizations will assist with identifying the righ mix of appropriately trained health care professio site (providing and receiving) based on patient ne Interprofessional teams may include: Obstetri specialists in addictions, NPs with perinatal er GPs, RNs, pharmacy, laboratory, mental health/counselling, and social work

Health Care System Level	Recommendations	Suggestions for Implementation	
		• Providers are responsible for identifying the support services in each community and appropriate alternatives where no services exist.	
	6. Readiness: TM providers will consider community (patient, provider, organization, rural setting) readiness prior to TM implementation.	• Organizations will ensure that the environment is "ready" for TM prior to implementation and put strategies in place to assist with identifying patient, provider, and organizational readiness based on a needs analysis using Jennett et al.'s (2003) TM readiness framework. This will include a focus on community consultation and rural provider involvement.	
Micro	 TM providers create and maintain culturally safe environments with an emphasis on equity-oriented care that fosters quality health care interactions between providers and patients. 	 TM providers can consider implementing the following measures to foster equity-oriented care as demonstrated in Holyk et al.'s (2017) study: Ensure a welcoming clinic space that includes community input Incorporate a blended model approach of in-person services supported by TM encounters. Ensure TM clinic rooms protect and maintain patient privacy Ensure video equipment is well-positioned to promote appropriate eye contact between the provider and patient. Provide opportunities for community engagement prior to TM implementation (e.g. TM encounter demonstrations and education). Address barriers to care including social determinants of health 	

Health Care	Recommendations	Suggestions for Implementation
System		
Level		
Micro	 Follow all ethical and legal requirements that relate to patient decision-making and obtain informed consent. 	 Patients have a right to the following information: who is participating in the encounter how a TM encounter will work potential risks and benefits the choice to decline and available alternatives contingency plans should the equipment fail during an encounter how security, privacy, and confidentiality will be maintained who is responsible for on-going care what to do in an emergency the right to withdraw consent at any time

Limitations and Future Directions

A major limitation to this integrated literature review is the external validity of its findings to pregnant women with OUD in northern BC. To date, no studies have been conducted that specifically address this population in the context of TM and rurality. While the findings of this review have also been discussed in the context of primary care services in northern BC, direct recommendations for rural pregnant women with OUD cannot be made solely upon this research. Only two of the 11 studies in this review included Indigenous populations, which are widely represented in northern BC. Although no attempt was made to include/exclude participants of ethno-cultural backgrounds due to the scarcity of research on the topic of interest, this review acknowledges that the findings must also be considered in the context of the historical, cultural, and geographic influences that have occurred with Indigenous populations in northern BC. Thus, all recommendations presented in this review should be guided and implemented with the knowledge and expertise of Indigenous peoples of northern British Columbia.

Another limitation to this review is the lack of attention towards funding models that support interprofessional collaborative efforts that are required for TM applications. In particular, funding models that are more responsive to working with fee-for-service (FFS) primary care providers. For example, groups of existing FFS primary care providers could apply directly through the NP funding process to add an NP to their team to improve primary care access. Thus, the NP would become an employee of the entity requesting the funding. This is currently being proposed by the British Columbia Nurse Practitioner Association (BCNPA) as a new model to integrate NPs into primary care (BCNPA, 2016); an area that will require further attention by the health authorities in BC if TM is to be sustainable. Further research conducting quantitative and qualitative studies is required. Higher quality quantitative research such as quasi-experimental designs would help to identify positive and negative outcomes of OAT via TM; thus, making it an ideal method given BC's geography (limited availability of sample sizes with multiple dispersed rural locations). Qualitative research is needed to examine those outcomes and to explore rural pregnant women's experiences following OAT via TM. It is also important to focus on how TM was perceived by the staff who experienced it, namely rural providers.

Although only briefly identified in this review, change management theory may play a significant role in the adoption of new innovations such as TM. With current political discourse emphasizing a need for change in the delivery of health care services for rural populations, researchers must look to provide quality evidence for best approaches to successfully achieve change. The lack of a robust body of literature to assess the applicability of change management models in TM presents an excellent opportunity for further research.

Lastly, findings from this review have the potential to move beyond pregnant women with OUD to include a broad range of reproductive health issues affecting rural women in BC, such as: obesity, cervical cancer screening, colposcopy services, mental health, SUD (alcohol, tobacco, marijuana, and other substances), and the myriad other health issues that disproportionately affect rural populations. TM holds incredible potential for decreasing the barriers associated with geography, and as such, all health care providers have the opportunity to unite their expertise to include their full scope of practice. This too, presents excellent opportunities for further research into the reproductive health issues facing vulnerable populations and team-based models of care in the context of TM applications in BC.

Conclusion

Primary care providers in BC have an opportunity to assist in guiding policy and planning in TM innovations. Delivering care to rural pregnant women is a major concern for primary care providers because of the medical, social, and legal consequences of OUD for mother and fetus. Increased mortality and morbidity for the dyad is severe. Effective evidence-informed treatment for OUD in pregnancy includes methadone and buprenorphine; however, further consideration for prescribers, dispensing pharmacies, and locally available supports in rural communities is needed. TM has the ability to overcome these geographic barriers and help deliver OAT services to BC's most vulnerable populations. However, this integrated review illustrates issues of quality research in TM. A better understanding of TM approaches and resultant outcomes in quality, access, and acceptability are needed.

Key elements of TM that contribute to effective and efficient health care delivery service include: CPGs, clinical outcomes, rural settings, human resources, and community readiness. As health care organizations continue to invest in TM, it is important to pay specific attention to community readiness. Gaining a greater understanding in TM readiness is an important first step in the successful design, implementation, and evaluation of such complex innovations as TM.

It appears TM is a promising health care modality. However, more work needs to be done to ensure TM provides effective and efficient health care services. New research must consider the context, location, and timing of how TM is being implemented, in a way that is conceptualized to uphold the principles and priorities of delivering care to pregnant women with OUD in northern BC. This includes consideration of how TM translates from a policy level to a workable program level and in turn, implemented locally. Lastly, the findings of this review have the potential to build on the work of Holyk, Pawlovich, Ross, and Hooper's (2017) equity-oriented approach to TM-based care and provide a key direction going forward. This will ensure the successful transition of a new primary care innovation such as TM into real clinical practice in the context of rural pregnant women with OUD in northern BC. To conclude, a quote by Muriel Strode is offered:

> Do not follow where the path may lead. Go instead where there is no path and leave a trail.
References

- Abrans, D. J., & Geier, M. R. (2006). A comparison of patient satisfaction with telehealth and on-site consultations: a pilot study for prenatal genetic counseling. *Journal of Genetic Counseling*, *15*(3), 199-205. doi:10.1007/s10897-006-9020-0
- American College of Obstetricians and Gynecologists. (2017). *Opioid use and opioid use disorder in pregnancy*. Retrieved from Washington, DC: www.acog.org
- ATA. (2007). Core standards for telemedicine operations. Retrieved from https://www.nursing.umn.edu/sites/nursing.umn.edu/files/americantelemedicineassociatio n_corestandardsfortelemedicineoperations.pdf
- ATA. (2010). Practice guidelines for videoconferencing-based telemental health. *Telemedicine* and e-Health, 16(10), 1074-1089. doi:10.1089/tmj.2010.0148
- ATA. (2017a). American Telemedicine Association guidelines for teleburn. *Telemedicine and e-Health*, 23(5), 365-375. doi:10.1089/tmj.2016.0279
- ATA. (2017b). American Telemedicine Association: Telestroke guidelines. *Telemedicine and e-Health, 23*(5), 376-389. doi:10.1089/tmj.2017.0006
- Australia Bureau of Statistics. (2011). Australia social trends March 2011: Health outside major cities. Retrieved from Sydney, NSW: www.abs.gov.au
- BC Gov. (2016). Provincial health officer declares public health emergency [Press release]. Retrieved from https://news.gov.bc.ca/releases/2016HLTH0026-000568
- BC Ministry of Health. (2015). *Rural health services in BC: A policy framework to provide a system of quality care*. British Columbia: Author Retrieved from http://www.health.gov.bc.ca/library/publications/year/2015/rural-health-policy-paper.pdf.
- British Columbia Center on Substance Use [BCCSU]. (2017). *A guideline for the clinical management of opioid use disorder*. Retrieved from http://www.bccsu.ca/wp-content/uploads/2017/06/BC-OUD-Guidelines_June2017.pdf
- Browne, A. J., & Tarlier, D. S. (2008). Examining the potential of nurse practitioners from a critical social justice perspective. *Nursing Inquiry*, *15*(2), 83-93. doi:10.1111/j.1440-1800.2008.00411.x

- Browne, A. J., Varcoe, C., Ford-Gilboe, M., & Wathen, C. N. (2015). EQUIP healthcare: An overview of a multi-component intervention to enhance equity-oriented care in primary health care settings. *International Journal for Equity in Health*, *14*(152), 1-11. doi: 10.1186/s12939-015-0271-y
- Caffery, L. J., Martin-Khan, M., & Wade, V. (2016). Mixed-methods for telehealth for research. *Journal of Telemedicine and Telecare*. doi: 10.1177/1357633X16665684
- Campbell, A. N., Miele, G. M., Nunes, E. V., McCrimmon, S., & Ghitza, U. E. (2012). Webbased, psychosocial treatment for substance use disorders in community treatment. *Psychological Services*, 9(2), 212-214. doi:10.1037/a0025968
- Canadian Institute for Health Information. (2006). *How Healthy are rural Canadians? An assessment of their health status and health determinants*. Retrieved from www.cihi.ca
- Center for Disease Control and Prevention. (2013). *CDC health disparities and inequalities report - United States, 2013.* Retrieved from Atlanta, GA: https://www.cdc.gov/mmwr/pdf/other/su6203.pdf
- Copeland, J., & Martin, G. (2004). Web-based interventions of substance use disorders: a qualitative review. *Journal of Substance abuse Treatment*, *26*(2), 109-116. doi:10.1016/S0740-5472(03)00165-X
- Craig, P., Dieppe, P., Macintyre, S., Michie, S., Nazareth, I., & Petticrew, M. (2006). *Developing and evaluating complex interventions: new guidance*. Retrieved from www.mrc.ac.uk/complexinterventionsguidance
- Nurse practitioner standards, limits and conditions: Opioid agonist treatment prescibing for opioid use disorder. NOT YET IN EFFECT, (2017a).
- CRNBC. (2017b). *Responding today, preparing for tomorrow: 2016-2017 annual report* (Pub. No. 245). Retrieved from Vancouver, BC: www.crnbc.ca
- CRNBC. (2017c). Scope of practice for nurse practitioners: Standards, limits and conditions (Pub. No. 688). Retrieved from Vancouver, BC: www.crnbc.ca
- CRNBC. (2018). Nurse Practitioner. In. Vancouver, BC: Author.

- Dalfra, M. G., Nicolucci, A., Lapolla, A., & TISG. (2009). The effect of telemedicine on outcome and quality of life in pregnant women with diabetes. *Journal of Telemedicine* and Telecare, 15(5), 238-242. doi:10.1258/jtt.2009.081213
- Doctors of BC. (2014). Telemedicine in primary care: Policy statement [Press release]. Retrieved from https://www.doctorsofbc.ca/
- du Plessis, V., Beshiri, R., & Bollman, R. D. (2002). *definitions of "rural"* (61). Retrieved from Ottawa, ON: https://ageconsearch.umn.edu/bitstream/28031/1/wp020061.pdf
- Ekeland, A. G., Bowes, A., & Flottorp, S. (2010). Effectiveness of telemedicine: A systematic review if reviews. *International Journal of Medical Informatics*, 79(11), 736-771. doi:10.1016/j.ijmedinf.2010.08.006
- Farmer, A. J., Gibson, O. J., Tarassenko, L., & Neil, A. (2005). A systematic review of telemedicine interventions to support blood glucose self-monitoring in diabetes. *Diabetic Medicine*, 22(10), 1372-1378. doi:10.1111/j.1464-5491.2005.01627.x
- Field, M.J. (1996). *Telemedicine: A guide to assessing telecommunications in health care*. In. Retrieved from http://www.nap.edu/catalog/5296.html
- Finnegan, L. (2013). *Licit and illicit drug use during pregnancy: Maternal, neonatal and early childhood consequences*. Retrieved from Ottawa, ON: http://www.ccsa.ca
- Flodgren, G., Rachas, A., Farmer, A. J., Inzitari, M., & Sheppard, S. (2015). Interactive telemedicine: Effects on professional practice and health care outcomes (review). *Cochrane Database of Systematic Reviews*, 7(9). doi:10.1002/14651858.CD002098.pub2
- Fraser, S., Mackean, T., Grant, J., Hunter, K., Towers, K., & Ivers, R. (2017). Use of telehealth care of Indiginous peoples with chronic conditions: a systematic review. *Rural and Remote Health*, 17(3), 4205. doi:10.22605/RRH4205
- Frueh, C. B., Henderson, S., & Myrick, H. (2005). Telehealth service delivery for persons with alcoholism. *Journal of Telemedicine and Telehealth*, 11(5), 372-375. doi:10.1258/135763305774472060
- Government of BC. (2017). *Regional health authorities*. Retrieved from British Columbia: https://www2.gov.bc.ca/gov/content/health/about-bc-s-health-caresystem/partners/health-authorities/provincial-health-services-authority

- Government of Canada. (2011). *Canadian alcohol and drug use monitoring survey*. Ottawa, ON: author Retrieved from https://www.canada.ca/en/health-canada/services/health-concerns/drug-prevention-treatment/drug-alcohol-use-statistics/canadian-alcohol-drug-use-monitoring-survey-summary-results-2011.html.
- Grindlay, K., Lane, K., & Grossman, D. (2013). Women's and provider's experiences with medical abortion provided through telemedicine: A qualitative study. *Women's Health Issues*, 23(2), e117-e122. doi:10.1016/j.whi.2012.12.002
- Grubaugh, A. L, Cain, G. D., Elhai, J. D., Patrick, S. L., & Frueh, C. (2008). Attitudes toward medical and mental health care delivered via telehealth applications among rural and urban primary care patients. *The Journal of Nervous and Mental Disease*, 196(2), 166-170. doi:10.1097/NMD.0b013e318162aa2d
- Handelsman, L., Stein, J. A., & Grella, C. E. (2005). Contrasting predictors of readiness for substance abuse treatment in adults and adolescents: a latent variable analysis of DATOS and DATOS-A participants. *Drug Alcohol Dependence*, 80(1), 63-81. doi: 10.1016/j.drugalcdep.2005.03.022
- Hardin, L., Kilian, A., & Spykerman, K. (2017). Competing health care systems and complex patients: An inter-professional collaboration to improve outcomes and reduce health care costs. *Journal of Interprofessional Education & Practice*, 7, 5-10. doi:10.1016/j.xjep.2017.01.002
- Harris, A. D., McGregor, J. C., Perencevich, E. N., Furuno, J. P., Zhu, J., Peterson, D. E., & Finkelstein, J. (2006). The use and interpretation of quasi-experimental studies in medical informatics. *Journal of the American Medical Informatics Association*, 13(1), 16-23. doi:10.1197/jamia.M1749
- Hassija, C., & Gray, M. J. (2011). The effectiveness and feasibility of videoconferencing technology to provide evidenced-based treatment to rural domestic violence and sexual assault populations. *Telemedicine and e-Health*, *17*(4), 1-7. doi:10.1089/tmj.2010.0147
- Hitt, W. C., Low, G., Bird, T. M., & Ott, R. (2013). Telemedical cervical cancer screening to bridge medicaid service care gap for rural women. *Telemedicine and e-Health*, 19(5), 403-408. doi:10.1089/tmj.2012.0148
- Hod, M., & Kerner, R. (2003). Telemedicine for antenatal surveillance of high-risk pregnancies with ambulatory and home fetal heart rate monitoring: an update. *Journal of Perinatal Medicine*, 31(3), 195-200. doi:10.1515/JPM.2003.026

- Holden, D., & Dew, E. (2008). Telemedicine in a rural gero-psychiatric inpatient unit: Comparison of perception/satisfaction to onsite psychiatric care. *Telemedicine and e-Health*, 14(4), 381-384. doi:10.1089/tmj.2007.0054
- Holyk, T., Pawlovich, J., Ross, C., & Hooper, A. (2017). The role of telehealth of improving continuity of care: The Carrier Sekani Primary Care Model.
- Homko, C. J., Deeb, L. C., Rohrbacher, K., Mulla, W., Mastrogiannis, D., Gaughan, L., ... Bove, A. A. (2012). Impact of a telemedicine system with automated reminders on outcomes in women with gestational diabetes mellitus. *Diabetes Technology and Therapeutics*, 14(7), 624-629. doi:10.1089/dia.2012.0010
- Hudack, M. L., & Tan, R. C. (2012). Neonatal drug withdrawal. *Pediatrics*, 129(2), e540-e560. doi:10.1542/peds.2011-3212
- Institute of Medicine. (1996). Telemedicine: A guide to assessing telecommunications in health care. https://www.nap.edu/catalog/5296.html
- Institute of Medicine. (2011). *Clinical practice guidelines we can trust*. Retrieved from Washington, D.C.: https://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0079468/pdf/PubMedHealth_PMH007 9468.pdf
- Jennett, P, Jackson, A., Healy, T., Ho, K., Kazankian, A., Woolard, R., . . . Bates, J. (2003). A study of a rural community's readiness for telehealth. *Journal of Telemedicine and Telecare*, *9*(5), 259-263. doi:10.1258/135763303769211265
- Jhaveri, D., Larkins, S., Kelly, J., & Sabesan, S. (2016). Remote chemotherapy supervision model for rural cancer care: Perspectives of health professionals. *European Journal of Cancer Care, 25*(1), 93-98. doi:10.1111/ecc.12309
- Jumah, N. A. (2016). Rural, pregnant, and opioid dependent: A systematic review. *Substance Abuse, 10*(1), 35-41. doi:10.4137/SART.S34547
- Jumah, N. A., Graves, L., & Kahan, M. (2015). The management of opioid dependence during pregnancy in rural and remote settings. *Canadian Medical Association Journal*, 187(1), e41-e46. doi:10.1503/cmaj.131723

- Kerner, R., Yogev, Y., Belkin, A., Ben-Haroush, A., Zeevi, B., & Hod, M. (2004). Maternal selfadministered fetal heart rate monitoring and transmission from home in high-risk pregnancies. *International Journal of Gynaecology and Obstetrics*, 84(1), 33-39. doi:10.1016/S0020-7292(03)00331-X
- Labiris, G., & Petounin, A. (2004). A framework to assess the readiness for tele-opthalmolgy of glaucoma patients living in isolated communities. *Journal of Telemedicine and Telecare*, *10*(3), 184-185.
- Le Rouge, C. M., Garfield, M. J., & Hevner, A. R. (2015). Patient perspectives of telemedicine quality. *Patient Preference and Adherence*, *5*, 25-40. doi:10.2147/PPA.S67506
- Leon, A. C., Davis, L. L., & Krawmer, H. C. (2010). The role and interpretation of pilot studies in clinical research. *Journal of Psychiatric Research*, 45(5), 626-629. doi:10.1016/j.jpsychires.2010.10.008
- Levesque, J-F., Harris, M. F., & Russell, G. (2013). Patient-centered access to health care: conceptualisong access at the interface of health systems and populations. *International Journal for Equity in Health*, *12*(18). doi:10.1186/1475-9276-12-18
- Maheu, M. M., Whitten, P., & Allen, A. (2001). *E-health, telehealth, and telemedicine: A guide to startup and success*. In. Retrieved from http://web.a.ebscohost.com.prxy.lib.unbc.ca/ehost/ebookviewer/ebook/bmxlYmtfXzU2N zg5X19BTg2?sid=1da3b164-c639-42b7-afe4-7e0234a170c5@sessionmgr4009&vid=0&format=EB&rid=1
- McLean, S., Nurmatov, U., JLY, L., Pagliari, C., Car, J., & Sheikh, A. (2011). Telehealthcare for chronic obstructive pulmonary disease (review). *Cochrane Database of Systematic Reviews*, 6(8). doi:10.1002/14651858.CD007718.pub2
- McQueen, K., & Murphy-Oikonen, J. (2016). Neonatal abstinence syndrome. *The New England Journal of Medicine*, 375(25), 2468-2479. doi:10.1056/NEJMra1600879
- Morland, L. A., Greene, C. J., Rosen, C. S., Foy, D., Reilly, P., Shore, J., . . . Frueh, C. (2010). Telemedicine for anger management therapy in a rural population of combat veteran with posttraumatic stress disorder: A randomized noninferiority trial. *Journal of Clinical Psychiatry*, 71(7), 855-863. doi:4088/JCP.09m04blu
- Morland, L. A., Makintosh, M., Rosen, C. S., Willis, B. A., Resick, P., Chard, K., & Frueh, C. (2015). Telemedicine verses in-person delivery of cognitive processing therapy for

women with posttraumatic stress disorder: A randomized noninferiority trial. *Depression and Anxiety*, 32, 811-820. doi:10.1002/da.22397

- Muttitt, S., Vigneault, R., & Loewen, L. (2004). Integrating telehealth into Aboriginal healthcare: the Canadian experience. *International Journal of Circumpolar Health*, 63(4), 401-414.
- National Institute on Drug Abuse. (2012). *Principals of drug addiction treatment: A researchbased guide*. (12-4180). U.S.: National Institute of Health Retrieved from https://www.drugabuse.gov.
- Nazareth, S., Kontorinis, N., Muwanwella, N., Hamilton, A., Leembruggen, N., & Cheng, W. S. (2013). Successful treatment of patients with hepatitis C in rural and remote Western Australia via telehealth. *Journal of Telemedicine and Telecare*, 19(2), 101-106. doi:10.1258/jtt.2012.120612
- Office of the Provincial Health Officer. (2014). *BC Methadone maintenance system: Performance measures 2012/2013*. Retrieved from British Columbia: https://www2.gov.bc.ca/assets/gov/health/about-bc-s-health-care-system/office-of-theprovincial-health-officer/reports-publications/special-reports/methadone-2011-12.pdf
- Ohl, M., Dillon, D., moeckli, J., Ono, S., Waterbury, N., Sissel, J., ... Kaboli, P. (2013). Mixedmethods evaluation of a telehealth collaborative care program for persons with HIV infection in a rural setting. *Journal of General Internal Medicine*, 28(9), 1165-1173. doi:10.1007/s11606-013-2385-5
- Parkes, T., & Reist, D. (2010). British Columbia methadone maintenance treatment program: A qualitative systems review Summary report. https://www.uvic.ca/research/centres/carbc/assets/docs/report-methadone-maintenance-treatment-program.pdf
- Public Health Agency of Canada. (2009). *What mothers say: The Canadian maternity experiences survey*. Ottawa, ON: Author Retrieved from http://www.publichealth.gc.ca/mes.
- Rashiah, S. V., Publicover, M., K., Ewer. A., Khan, K. S., Kilby, M. D., & Zamora, J. (2006). A systematic review of the accuracy of first-trimester ultrasound examination for detecting major congenital heart disease. *Ultrasound in Obstetrics & Gynecology*, 28(1), 110-116. doi:10.1002/uog.2803

- Reading, L., & Wien, F. (2009). *Health inequalities and social determinants of Aboriginal peoples' health*. Retrieved from Prince George, B.C.: http://www.nccahccnsa.ca/docs/social%20determinates/nccah-loppie-wien_report.pdf
- Rose, G. L., Skelly, J. M., Badger, G. J., Naylor, M. R., & Helzer, J. E. (2012). Interactive voice response for relapse prevention following cognitive-behavioral therapy for alcohol use disorders: a pilot study. *Psychological Services*, 9(2), 174-184. doi:10.1037/a0027606
- Ross, A. A., Yap, T. L., van der Nest, J., Martin, K., & Edie, A. H. (2016). Increasing primary care access close to home for residents of remote communities in Northern Alberta. *Healthcare Quarterly*, 19(3), 61-66.
- Salisberry, C., O'Cathain, A., Edwards, L., Thomas, C., Gaunt, D., Hollinghurst, S., . . . Large, S. (2016). Effectiveness of an integrated telehealth service for patients with depression: A pragmaticrandomised controlled trial of a complex intervention. *Lancet Psychiatry*, 3(6), 515-525. doi:10.1016/S2215-0366(16)00083-3
- Schempf, A. H., & Strobino, D. M. (2008). Illicit drug use and adverse birth outcomes: Is it drugs or context. *Journal of Urban Health*, 85(6), 858-873. doi:10.1007/s11524-008-9315-6
- Schuckit, M. A. (2016). Treatment of opioid-use disorders. *New England Journal of Medicine*, 375(4), 357-368. doi:10.1056/NEJMra1604339
- Scott, R. E., McCarthy, F. G., Jennett, P. A., Perverseff, T., Lorenzetti, D., Saeed, A., . . . Yeo, M. (2007). Telehealth outcomes: A synthesis of the literature and recommendations for outcomes indicators. *Journal of Telemedicine and Telecare*, *13*(2), 1-38. doi:10.1258/135763307782213552
- SOGC. (2017a). Epidemiology and effects of substance use in pregnancy. *Journal of Obstetricians an Gynaecologists of Canada, 39*(10), 906-915. doi:https://doi.org/10.1016/j.jogc.2017.07.005
- SOGC. (2017b). Screening and mangement of substance use in pregnancy: A review. Journal of Obstetricians an Gynaecologists of Canada, 39(10), 897-905. doi:https://doi.org/10.1016/j.jogc.2017.07.017
- SOGC. (2017c). SOGC clinical practice guideline: No. 349-Substance use in pregnancy. *Journal* of Obstetricians an Gynecologists of Canada, 39(10), 922-937. doi:http://dx.doi.org/10.1016/j.jogc.2017.04.028

- Statistics Canada. (2011). *Population, urban and rural, by province and territory (Canada)*. Retrieved from Ottawa, ON: https://www.statcan.gc.ca/tables-tableaux/sumsom/l01/cst01/demo62a-eng.htm
- Substance Abuse and Mental Health Services Administration. (2011). *Results from the 2010 national survey on drug use and health: Summary of national findings* (11-4658). Retrieved from Rockville, MD: http://store.samhsa.gov/home

The Alliance for Building Capacity (ABC). (2002). Framework for rural and remote readiness in telehealth: Project report for CANARIE. https://webcache.googleusercontent.com/search?q=cache:O0vxJloWxP8J:https://dspace.u calgary.ca/bitstream/1880/43064/1/ABC%2520Framework%2520for%2520Rural%2520 and%2520Remote%2520Readiness%2520in%2520Telehealth.pdf+&cd=1&hl=en&ct=cl nk&gl=ca

- Turner, S. D., Gomes, T., Camacho, X., Yao, Z., Guttmann, A., Mamdani, M. M., . . . Dhalla, I. A. (2015). Neonatal opioid withdrawal and antenatal opioid prescribing. *Canadian Medical Association Journal*, 3(1), E55-E61. doi:10.9778/cmajo.20140065
- U.S. Department of Health and Human Services Food and Drug Administration. (2016). *Non-inferiority clinical trials to establish effectiveness: Guidance for industry*. Retrieved from Silver Spring, MD: https://www.fda.gov/downloads/Drugs/Guidances/UCM202140.pdf
- Verhoeven, F, Gemert-Pijnen, L., Dijkstra, K., Nijland, N., Seydel, E., & Steehouder, M. (2007). The contribution of teleconsultation and videoconferencing to diabetes care: A systematic literature review. *Journal of Medical Internet Research*, 9(5), e37.
- Vinals, F., Mandujano, L., Vargas, G., & Giuliano, A. (2005). Prenatal diagnosis of congenital heart disease using four-dimensional spatio-temporal image correlation (STIC) telemedicine via an internet link: a pilot study. *Ultrasound in Obstetrics & Gynecology*, 25(1), 25-31. doi:10.1002/uog.1796
- Vuvinovic, M., Roje, D., Vucnovic, Z., Capkun, V., Bucat, M., & Banovic, I. (2008). Maternal and neonatal effects of substance use during pregnancy: our ten year experience. *Yonsier Medical Journal*, 49(5), 705-713. doi: 10.3349/ymj.2008.49.5.705
- Whittemore, R., & Knafl, K. (2005). The integrative review: Updated methodology. *Journal of Advanced Nursing*, *52*(5), 546-553. doi:10.1111/j.1365-2648.2005.03621.x

- WHO. (2015). *Health services delivery: a concept note*. Retrieved from Europe: www.euro.who.int
- World Health Organization. (2010). Telemedicine: Opportunities and developments in member states. 2. http://www.who.int/goe/publications/goe_telemedicine_2010.pdf
- Wyatt, S. N., Rhoads, S. J., Green, A. L., Ott, R. E., Sandlin, A. T., & Magann, E. F. (2013). Maternal response to high-risk obstetric telemedicine consults when perinatal prognosis is poor. *Australian and New Zealand Journal of Obstetrics and Gynecology*, 53, 484-497. doi:10.111/ajo.12094

Appendix A

DSM-5 Criteria for Opioid Use Disorder

1	Opioids are often taken in larger amounts or over a longer period than was intended	
2	There is a persistent desire or unsuccessful efforts to cut down or control opioid use	The presence of at least 2 of these symptoms
3	A great deal of time is spent in activities necessary to obtain the opioid, use the opioid, or recover from its effects	indicates an Opioid Use Disorder (OUD)
4	Craving or a strong desire to use opioids	The severity of the OUD is defined as:
5	Recurrent opioid use resulting in a failure to fulfill major role obligations at work, school, or home	MILD: The
6	Continued opioid use despite having persistent or recurrent social or interpersonal problems caused or exacerbated by the effects of opioids	presence of 2 to 3 symptoms
7	Important social, occupational, or recreational activities are given up or reduced because of opioid use	MODERATE: The presence of
8	Recurrent opioid use in situations in which it is physically hazardous	4 to 5 symptoms
9	Continued use despite knowledge of having a persistent or recurrent physical or psychological problem that is likely to have been caused or exacerbated by opioids.	SEVERE: The
10	Tolerance, as defined by either of the following:	presence of 6 or more symptoms
	 a) Need for markedly increased amounts of opioids to achieve intoxication or desired effect 	
	b) Markedly diminished effect with continued use of the same amount of opioid	
11	Withdrawal, as manifested by either of the following:	
	a) Characteristic opioid withdrawal syndrome	
	b) Same (or a closely related) substance is taken to relieve or avoid withdrawal symptoms	
04.11	$\alpha \alpha + \Lambda m \alpha m \alpha \alpha + \Lambda \alpha \alpha \alpha \alpha + \alpha + \alpha + \alpha + \alpha + \alpha + \alpha$	

Source: American Psychiatric Association (2013)

Appendix B

Opioid Substitution Treatment by Health Authority, BC 2012/2013

Patients, Active Prescribers, Pharmacists, Pharmacies

			1	
Health Authority	Patient	Active Prescriber	Pharmacists	Pharmacies
Northern	430	21	189	45
Fraser	6,716	76	1,188	279
Vancouver	4,722	173	906	197
Victoria	2,787	61	564	137
Interior	2,338	29	563	146
BC Total	15,754	344	2,886	804

Source: Office of the Provincial Health Officer (2014)

Appendix C TM Definitions

Organization	Definition
World Health Organization (WHO, 2010)	"Telemedicine is 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" (p. 9).
Institute of Medicine (1996)	"Telemedicine is the use of electronic information and communications technologies to provide and support health care when distance separates participants" (p. 1)
The College of Physicians and Surgeons of BC (CPSBC, 2015)	"Telemedicine is the provision of medical expertise for the purpose of diagnosis and patient care by means of telecommunications and information technology where the patient and the provider are separated by distance. Telemedicine may include, but is not limited to, the provision of pathology, medical imaging and patient consultative services" (p. 1).
College of Registered Nurse of BC (CRNBC, 2017)	"Telehealth refers to the use of communications and information technology to deliver health and health care services and information over large and small distances" (p. 1).

Appendix D

Rural Readiness for Telehealth Model

Type of	Public	Patient	Practitioner	Organization
readiness				
Core Readiness	Dissatisfaction with the current state of health-care Dissatisfaction with typical doctor-patient interaction; desire for a more comfortable setting for obtaining health information; Desire for change Isolation; poor access	Sense of isolation, lack of access Recognition of unmet need Desire for change; willingness actively to help themselves or their condition	Extreme dissatisfaction with the status quo First-hand understanding or experience of negative effects of isolation Driving need to address a public or patient problem (as opposed to a practitioner - specific one)	Recognition of unaddressed needs; Dissatisfaction with the organizational status quo
Engagement				
	Wanting to know what telehealth is; having a clear definition of telehealth Recognizing (or estimating) the benefits of telehealth Having a sensitive health condition; desire for privacy regarding health practice	Knowledge about what exactly telehealth is Knowledge about the benefits (or anticipated benefits) Fear of damaging equipment Gender Privacy concerns Availability and reliability of content that fits rural or remote culture Address concerns about Sense of ownership telehealth as a replacement for existing services	Innovators; champions Sense of curiosity Peer influence Evidence of utility Inter-group cooperation (between practitioners and the other domains) Intra-group cooperation (between working practitioners) Communication Openness; respect for others Willingness to make initial extra investment in time	Champions Availability of risk takers, pioneers Education and awareness for innovators Reduction of nay-sayers /resisters; Ability/willingness of senior administration to consider benefits outside standard business case/cost- effectiveness schemes; Willingness to consider long timelines for implementation; Movement from short-term funding; short-term accountability deadlines Cost-benefit analysis Established mechanisms of knowledge transfer between staff
Structural			Addressing scheduling	
Readiness	Education/Availability of formal	Education about telehealth	concerns; overextended	Identification of equipment

Type of readiness	Public	Patient	Practitioner	Organization
	and informal information networks Availability of testimonials from people Awareness campaigns Champions, especially local ones Community consultation sessions; sense of ownership Healthy inter-organizational dynamics in promotion activity	Awareness of telehealth; overcoming sense of vulnerability in videoconference Ability or training to use equipment Practitioner-mediated liaison for telehealth programmes	workloads 24-hour access to equipment Established reimbursement plans Reliability of equipment; good technical support; backup plans Confirmation of reliable and available clinical consultants Reliable content (clinical and continuing medical education) Liability	difficulties; 'bugs' Well conducted needs assessment Community consultation process; ownership Allowance for creative use of equipment by practitioners and patients Accessible, comprehensive technical support, locally available and on-call Effective scheduling; integration into the routine Proper facilities (lighting, size, heating); adequate equipment Accessible, sustained staff training (including training at medical school to encourage routine perception) Provision of a telehealth coordinator Written policy on reimbursement, liability, cross-jurisdiction use, privacy Sufficient ongoing funding (local, provincial, federal)

Source: Adapted from: Jennett et al. (2003).

Literature Review Matrix

Article / Study	Sample/Sample	Data Collection	Setting	Limitations	Study findings that
Design / & Overview	size		Providing site (PS)		help answer
			Receiving Site (RS		research question
Morland et al., 2010	Randomized	Veteran	PS & RS at the same	Not rural	TM meets same
Hawaii, U.S.	125 male	satisfaction survey	tertiary site		standards of
	veterans w PTSD	(validated)		Lacked clarity of	care as FTF
Non-inferiority RCT.	61 Intervention		HCPs – limited data,	HCP roles between	
	64 Control	patient reported	qualified mental	PS & RS	Valid and reliable
Comparing outcomes	Adequate	scales (validated)	health therapist		data collection tools
of anger management	Randomization	CAPS; Trait anger	providing care	Program created for	
therapy via TM with	(similar	scale; PTSD		study/services	Evidenced-based
FTF care	demographic	checklist	12 evidenced-based	ceased after	care: psychotherapy
	variables for both		CBT sessions with 2	completion	
	groups	DSM-IV criteria	sessions per week		High risk
			for 6 weeks		populations
		Scores compared at			
	Adequate power	baseline, mid-			+ response to
	86%-97%	treatment,			treatment (↓
		posttreatment and 3			symptoms)
		& 6 months			
		posttreatment			
		Adequate power to			
		detect inferiority			
		Statistical analysis			
		consistent with non-			
		inferiority trials			

Article / Study	Participants	Data collection	Setting	Limitations	Study findings
Design / & Overview		method	HCPs at the		that help answer
			Providing site (PS)		research question
			Receiving Site (RS		
Morland et al. (2015)	Randomized	Veteran satisfaction	PS & RS at the same	Not rural	TM meets same
Hawaii, U.S.	126 female	survey (validated)	tertiary site – no		standards of
	civilian &		other data provided	Program created for	care as FTF
Non-inferiority RCT	veteran w PTSD	TM specific		study/services	
	Adequate	satisfaction scale	HCPs – limited data,	ceased after	Valid and reliable
Comparing outcomes	Randomization	(psychometric	qualified mental	completion	data collection tools
for PTSD treatment	(similar	properties not	health therapist		
via TM verses FTF	demographic	reported)	providing care	Lacked clarity of	Evidenced-based
care	variables for			HCP roles between	care: psychotherapy
	both groups	Mental health	12, 90 min	PS & RS	
		patient reported	evidenced-based		High risk
	mean age 46;	scales (validated)	sessions with 1-2		populations
	Caucasian 47%,	CAPS	sessions per week		
	ethnic 53%; 46%				+ response to
	have current	DSM-IV criteria			treatment (↓
	comorbid				symptoms)
	psychiatric	Scores compared at			
	conditions	baseline, mid-			
	(depression/anxi	treatment, 2 weeks			
	ety, substance	posttreatment, and			
	use)adequate	3 & 6 months			
	power 0.90	posttreatment			

Article / Study	Sample/Sample size	Data Collection	Setting	Limitations	Study findings
Design / & Overview			Providing site		that help answer
			(PS)		research question
			Receiving Site		
Grindlay et al. (2013) U.S. Descriptive qualitative study Participant experiences (HCPs and women) of providing medical abortion services via TM	n=25 pregnant women (majority 18-24 y/o) n=15 HCPs (GPs, RNs, medical assistants, clinic managers) Convenience sampling	Consistent with method; Semi- structured interviews (digitally recorded, transcribed verbatim) Inductive thematic coding	Receiving Site (RS PS – tertiary clinic GP RS – unknown	Rurality not well- defined Lacked clarity of HCP roles between PS & RS	In-depth patient & HCP perspectives High- risk/pregnancy population Evidenced-based: medications Operational program since 2008 TM integration into existing

Article / Study	Sample/Sample	Data Collection	Setting	Limitations	Study findings that
Design / & Overview	size		Providing site (PS)		help answer
			Receiving Site (RS		research question
Wyatt et al. (2013) U.S. Qualitative descriptive study Women's experiences of receiving a poor pregnancy prognosis via TM	n=8 pregnant women (mean age 30y/o) purposeful	Consistent with method; Semi- structured interviews (digitally recorded, transcribed verbatim) Iterative thematic coding	Receiving Site (RS) Receiving Site (RS) PS – specialist & other HCPs tertiary clinic RS – nurses, GP, U/S technician Distance lived from PS (mean 226km) Distance lived from TM clinic (mean 33km)	Rurality not fully defines Lacked clarity of HCP roles between PS & RS	research question In-depth patient experiences high risk/pregnancy population operational program since 2002 Evidenced-based care: primary care Study resulted in program improvements
					existing services

	1			1	
Article / Study	Sample/Sample	Data Collection	Setting	Limitations	Study findings that
Design / & Overview	size		Providing site (PS)		help answer research
			Receiving Site (RS		question
Jhaveri et al. (2016)	Purposeful	Consistent with	PS – specialist,		In-depth HCP
Australia	sample	method	pharmacist & RNs		experiences, including
	n= 19 HCPs		tertiary clinic	no data on	RS HCPs
Descriptive		Semi-structured		patient	
qualitative study	specialists, GPs,	interviews	RS – GPs, RNs.	acceptability	Evidenced-based care:
HCP perspectives of	RNs, pharmacist	(digitally recorded,	pharmacist at 3 rural		medication
providing		transcribed	satellite sites 112,		
chemotherapy		verbatim)	202, 438 km from		HCP type and mix
services for rural			PS with populations		identified at RS & PS
populations via TM		Iterative thematic	4800, 10,500, 8300		
		coding			TM integration into
					existing services
		Triangulation			
					Interprofessional
					collaboration
					TM framework used
					Blended services (1 FTF
					supported by TM visits)
					high risk populations
					TM safety addressed

Article / Study	Sample/Sample	Data Collection	Setting	Limitations	Study findings that
Design / & Overview	size		Providing site (PS)		help answer
			Receiving Site (RS		research question
Ohl et al. (2013)	96% male	Quantitative: one-	PS – specialist,	Rurality not well-	Evidenced-based:
U.S.	Veteran (median	group pre/post-test	pharmacist & nurses	defined	medication &
	age 54)	Paired t-	at a tertiary center		primary care
Mixed-methods		test/McNemar		Threats to internal/	
3 year study	Quantitative		RS: 7 rural TM sites	external validity	Interprofessional
Evaluated the use of	n=30 (n=17	satisfaction survey	with GPs/NPs		collaboration
TM for providing HIV	pre/post period;	(validated for		Power analyses not	
care	n=24 start of	veteran use)	Operating one half	obtained	HCP type and mix
	treatment/post)		day/week		at RS & PS
	N=5 new patients			TM specific	
	half way through	Qualitative: semi-		instruments not	TM framework
		structured		used	
	Non-random	interviews (digitally			+ response to
	Convenience	recorded,			treatment outcomes
		transcribed			
	qualitative n=13	verbatim)			30/32 chose TM
					due to convenience,
		Iterative thematic			cost, travel
		saturation			medical home
					model
					High-risk
					populations
					TM integration into
					existing services

Article / Study	Sample/Sample	Data Collection	Setting	Limitations	Study findings that
Design / & Overview	size		Providing site (PS)		help answer
			Receiving Site (RS		research question
Nazareth et al. (2013)	Sample method	Pre/post-test	PS – specialists,	Rurality not well-	Study method
Australia	unclear	Clopper-Pearson	NPs, pharmacist	defined	
	(convenience	95% CI	tertiary hospital		TM specific
4 year Longitudinal	/purposeful)				satisfaction survey
quasi-experimental		TM satisfaction	RS – GPs nurses	Blended services	(+ responses)
Comparative study	TM n=50 (50%	survey		(FTF & TM) not	
	female, mean age	(psychometric		well-defined	Evidenced-based:
Compared TM to FTF	46)	properties not			medications
Hep C treatment	convenience	reported)		Threats to internal	
responses				validity	TM safety
	FTF n=559 (35%			T 1 1 1 /	TT' 1 ' 1
	temale, mean age			Lacked adequate	High-risk
	43) comparison			power	populations
	group			Confounding factors	UCD type and mix
				not analyzed	
				not analysed	KS & FS
					Interprofessional
					collaboration
					condooration
					+ response to
					treatment
					50/50 chose TM for
					convenience, cost.
					travel

Article / Study	Sample/Sample	Data Collection	Setting	Limitations	Study findings that
Design / & Overview	size		Providing site (PS)		help answer
			Receiving Site (RS		research question
Hassija & Gray	Sample method	TM specific	PS – mental health	Rurality not well-	Study method
(2011)	unclear	satisfaction scale	therapist tertiary	defined	TM specific
U.S.	(convenience	psychometric	clinic		satisfaction survey
	/purposeful)	properties not		Lacked clarity of	(+ responses)
Quantitative pilot		reported	RS – 3 TM	HCP roles between	
project	n=15 women		rape/crisis centers	PS & RS	Evidenced-based
	(mean 30 y/o)	Mental health	several hours away		care: mental health
Evaluated TM-based		patient reported	from PS, HCPs not	Threats to internal	& PC
treatment for women	No comparison	scales (validated)	reported	validity	
experiencing domestic	group	PTSD checklist			High risk
violence and sexual		CES-D depression	Weekly sessions		populations
assault		scale			
					Response to
		DSM-IV criteria			treatment (↓
					symptoms)
		Pre/post-test design			
		Cohen's d (effect			TM implemented
		size)			into existing
					services

	Sampic/Sampic	Data Collection	Setting	Limitations	Study findings that
esign / & Overview	size		Providing site (PS)		help answer
			Receiving Site (RS		research question
Hitt et al. (2013)	Sample method	One-question	PS – specialist	Rurality not well-	Study method
U.S.	unclear	satisfaction survey	tertiary center	defined	
	(convenience	(psychometric			High risk
uantitative 1 year	/purposeful)	properties not	RS - NPs in 4 rural	Lacked clarity of	population
lot project		reported)	satellite sites	HCP roles between	
	n= 1,298 women			PS & RS	Evidenced-based:
valuated colposcopy	(mean age 25)	Analyses not	Services 3hrs		PC
creening for rural		reported	weekly	Program ceased	
omen via TM	No comparison			after study	Interprofessional
	group			*** 1 1	collaboration
				Weak analyses	
					HCP type and mix
					RS & PS
					1200 1
					1298 women chose
					IM
Hitt et al. (2013) U.S. uantitative 1 year dot project valuated colposcopy creening for rural omen via TM	Sample method unclear (convenience /purposeful) n= 1,298 women (mean age 25) No comparison group	One-question satisfaction survey (psychometric properties not reported) Analyses not reported	PS – specialist tertiary center RS – NPs in 4 rural satellite sites Services 3hrs weekly	Rurality not well- defined Lacked clarity of HCP roles between PS & RS Program ceased after study Weak analyses	Study method High risk population Evidenced-base PC Interprofessiona collaboration HCP type and r RS & PS 1298 women ch TM

Article / Study	Sample/Sample	Data Collection	Setting	Limitations	Study findings that
Design / &	size		Providing site (PS)		help answer research
Overview			Receiving Site (RS		question
Ross et al. (2016)	Sample method	HCP-administered	PS – GP, NPs, RNs	Rurality not well-	Study method
AB, Canada	unclear	satisfaction survey	primary care clinic	defined	
	(convenience	(psychometric			Evidenced-based care
3 month pilot project	/purposeful)	properties not	RS – LPNs in 2	Weak statistical	primary care
Evaluated access to		reported)	rural communities	analyses	
primary care services	Sample size		over 280km away		Interprofessional
via TM for 2 rural	unclear (72%	Number of visits,	from PS	Threats to internal/	collaboration
First Nations	female; majority	reasons for care,		external validity	
communities	age 19-36	age	3 afternoons per		HCP type and mix
			week	Short study	identified at RS & PS
		Methods not		duration	
		defined			TM implemented into
					existing services
					Adjunct to primary
					care, not replacing in-
					person care
					Blended model (FTF &
					TM)
					TM safety addressed

Literature Review Matrix Cont. Article / Study Design / &	Sample/Sample size	Data Collection	Setting Providing site (PS) Receiving Site (RS	Limitations	Study findings that help answer
Overview			Receiving Site (RS		research question
Holyk et al. (2016) British Columbia Quantitative pilot project Examined primary care services via TM for rural communities	Sample method unclear (convenience /purposeful) n=210 64% female Mean age 47 No comparisons	Adapted TM satisfaction survey Not validated Adapted survey questions EQUIP Not validated Independent t-test (one-way ANOVA Welch) P-value = <0.05	PS – limited data reported, GP RS – HCPs not reported 11 rural sites (76,000 sq km) populations of 100- 1500	Rurality not well- defined Lacked clarity of HCP roles between PS & RS Unpublished Non-response bias	Study method TM specific satisfaction survey (+ responses) Evidenced-based care: primary care TM safety safe/respectful environment High risk populations High level of trust with TM Blended services 3:1 FTF/TM visits Primary care home TM integrated into existing services (Program running since 2011)

Appendix F

Johns Hopkins Nursing Evidenced-Based Practice

Evidence Level and Quality Guide

Evidence Levels	Quality Guides			
Level I Experimental study, randomized controlled trial (RCT) Systematic review of RCTs, with or without meta-analysis	A <u>High quality:</u> Consistent, generalizable results; sufficient sample size for the study design; adequate control; definitive conclusions; consistent recommendations based on comprehensive literature review that includes thorough reference to scientific evidence			
Level II Quasi-experimental study Systematic review of a combination of RCTs and quasi- experimental, or quasi-experimental studies only, with or without meta-analysis	 B <u>Good quality:</u> Reasonably consistent results; sufficient sample size for the study design; some control, fairly definitive conclusions; reasonably consistent recommendations based on fairly comprehensive literature review that includes some reference to scientific evidence 			
Level III Non-experimental study Systematic review of a combination of RCTs, quasi- experimental and non-experimental studies, or non- experimental studies only, with or without meta-analysis Qualitative study or systematic review with or without a meta-synthesis	C Low quality or major flaws: Little evidence with inconsistent results; insufficient sample size for the study design; conclusions cannot be drawn			

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Appendix F cont.

Directions for Use of This Form

Purpose: This form is used to compile the results of the evidence appraisal to answer the EBP question. The pertinent findings for each level of evidence are synthesized, and a quality rating is assigned to each level.

Total Number of Sources per Level: Record the number of sources of evidence for each level.

Overall Quality Rating: Summarize the overall quality of evidence for each level. Use the "Evidence Level and Quality Guide" (Appendix C) to rate the quality of evidence.

Synthesis of Findings: Evidence That Answers the EBP Question

- Include only findings from evidence of A or B quality.
- Include only statements that directly answer the EBP question.
- Summarize findings within each level of evidence.
- Record article number(s) from individual evidence summary in parentheses next to each statement so it is easy to identify the source of the finding.

Develop Recommendations Based on Evidence Synthesis and the Selected Translation Pathway: Review the synthesis of findings and determine which of the following four pathways to translation represents the overall strength of the evidence:

- Strong, compelling evidence, consistent results: solid indication for a practice change.
- Good and consistent evidence: consider pilot of change or further investigation.
- Good but conflicting evidence: no indication for practice change; consider further investigation for new evidence or develop a research study.
- Little or no evidence: no indication for practice change; consider further investigation for new evidence or develop a research study or discontinue project.

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Appendix F cont.

Category (Level Type)	Total Number of Sources/Level	Overall Quality Rating	Synthesis of Findings Evidence That Answers the EBP Ouestion
Level I • Experimental study • Randomized Controlled Trial (RCT) • Systematic review of RCTs with or without meta-analysis	2	A – High quality	TM provides comparable outcomes to FTF (1,2) Valid and reliable data collection tools (1,2) Evidenced-based care mental health treatment (1,2) High risk populations (1,2)
Level II • Quasi-experimental studies • Systematic review of a combination of RCTs and quasi-experimental studies, or quasi-experimental studies only, with or without meta-analysis	1	C – Low quality	Study method (3) TM specific satisfaction survey (+ responses) (3) Evidenced-based care medications (3) TM safety (3) High risk populations (3) HCP type and mix identified at RS & PS (3) Interprofessional collaboration (3) Clinical benefit (+ response to treatment) (3)
Level III • Non-experimental study • Systematic review of a combination of RCTs, quasi-experimental, and non-experimental studies, or non-experimental studies only, with or without meta-analysis • Qualitative study or systematic review of qualitative studies with or without meta-synthesis	3	A – High quality	Study method (4,5,6) Patient and HCP perspectives (4,5,6) Evidenced-based care medications & PC (4,5,6) Pregnancy/high risk populations (4,5,6) HCP type and mix identified at RS & PS (5) Interprofessional collaboration (5) TM safety (5) Rural – distance & population size (5)
Author Article # Morland et al. (2016) 1 Morland et al. (2015) 2 Nazareth et al. (2013) 3 Grindlay et al. (2013) 4 Jhaveri et al., (2016) 5 Wyatt et al. (2013) 6 Hassiia & Gray (2011) 7	2	B – Good Quality	Study method (7,8) TM specific satisfaction survey (+ responses) (7,8) Evidenced-based care (mental health & PC) (7,8) TM safety - safe environment (7,8) High risk populations (7,8) Response to treatment (↓ symptoms) (7) High level of trust with TM (8)
Holyk et al. (2016) 8 Hitt et al. (2013) 9 Ohl et al. (2013) 10 Ross et al. (2016) 11	3	C – Low quality	Study method (9,10,11) Clinical benefit (+ response to treatment) (10) Evidenced-based care medications & PC (9,10,11) Interprofessional collaboration (9,10,11) HCP type and mix identified at RS & PS (9,10,11)