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The effectiveness of telemedicine-delivered opioid agonist therapy in a supervised clinical setting

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ABSTRACT

Objective: Opioid use disorder has been declared a public health crisis across North America and opioid agonist therapy (OAT) is the standard of care for these patients. Despite the increasing adoption of telemedicine as a delivery method for OAT, its effectiveness has not yet been evaluated against traditional in-person treatment. This study compared treatment outcomes for in-person versus telemedicine-delivered OAT.

Methods: We conducted a non-randomized cohort comparison study using an administrative database for patients who commenced OAT between 2011 and 2012 across 58 clinic sites in the province of Ontario, Canada. Patients were stratified by primary treatment modality as being: in-person (< 25% appointments by telemedicine), mixed (25–75% by telemedicine), or via telemedicine (> 75% appointments by telemedicine). The primary outcome was continuous retention in treatment as defined by one year of uninterrupted therapy, based on pharmacy dosing records.

Results: A total of 3733 OAT initiating patients were identified. Patients treated via telemedicine were more likely to be retained in therapy than patients treated in-person (n = 1590; aOR = 1.27; 95% CI 1.14–1.41; p < 0.001). Telemedicine patients demonstrated a retention rate of 50% at one year whereas in-person patients were retained at a rate of 39%. The mixed group also had higher likelihood of retention than the in-person group (n = 418; aOR = 1.26; 95% CI 1.08–1.47; p = 0.001) and had a retention rate of 47% at one year.

Conclusion: Telemedicine may be an effective alternative to delivering in person OAT, and it has the potential to expand access to care in rural, remote, and urban regions.

1. Introduction

Opioid use disorder is an important health care issue across North America (Oliva et al., 2013); and it has reached crisis levels in urban and rural regions alike (Gomes et al., 2011; Miller, 2012; Park and Bloch, 2016). Opioid agonist therapy (OAT; using methadone or buprenorphine) is the standard of care for patients presenting with opioid dependence (CAMH, 2011; Health-Canada, 2002; Nosyk et al., 2010). In fact, methadone is listed as an essential medication by the World Health Organization (World Health Organization, 2013) as it is recognized to prevent the incidence of opioid-related overdose and the spread of transmissible infections such as HIV and hepatitis C (Connock et al., 2007; Conway et al., 2004; Reddon et al., 2013). From 2000 to 2015, the number patients in Ontario (Canada) who had initiated OAT increased from 6000 to over 40,000 (CAMH, 2011). The swell of patients seeking addiction therapy is largely attributed to increased availability and associated misuse of slow release opioid formulations, including oxycodone (Lynas, 2013a,b).

OAT is a harm reduction model of care where opioid agonists, such as methadone or buprenorphine/naloxone, are substituted in place of more addictive and dangerous opioids (CAMH, 2011; Health-Canada, 2002). OAT uses a maintenance and stabilization model of care, and patients' psychosocial functioning increasingly improves with longer time in treatment (Volkow et al., 2014). Conversely, relapses to problematic levels of opioid abuse or death from overdose are much more frequent when patients withdraw from treatment (Evans et al., 2015). Thus, maintenance treatment focuses on retaining the patient's gains in function through ongoing OAT. There is considerable evidence to support that one-year treatment retention is strongly correlated with positive health outcomes, including improved physical and mental health, and reduced drug usage, relapse, hospitalization, mortality, and illegal activity (Oliva et al., 2013; Peles et al., 2010). Therefore,

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patients are encouraged to remain in therapy over the course of several years. In this respect, maintenance treatment is fundamentally different from weaning and abstinence strategies because patients are allowed to remain on methadone or buprenorphine indefinitely (Peles et al., 2010).

In Ontario (Canada), patients receiving OAT begin treatment at a specialized addiction clinic in the care of an addiction physician. Only physicians can prescribe methadone, and a nurse or pharmacist can deliver observed daily dosing during treatment stabilization. Once stabilized, patients have the possibility of treatment in a family physician's office or community pharmacy where observed dosing takes place (Bell et al., 2006; Health-Canada, 2002). Improved psychosocial function—which requires retention in treatment often over the course of several years, with gradual reduction in the level of observed medication—is the intended outcome of this treatment model (Bell et al., 2006; Degenhardt et al., 2011; Health-Canada, 2002; Nosyk et al., 2009, 2010, 2012; Tetrault and Fiellin, 2012).

In Canada, methadone is a regulated narcotic, and physicians who prescribe methadone require a methadone prescribing exemption from the federal health ministry. Generally, these physicians are in limited supply across the province with noted shortages in northern and rural regions—regions that are typically underserved for a variety of medical and surgical specialties (Wenghofer et al., 2011). Due in part to the limited number of specialists in remote regions of the province, the Ontario Health Insurance Plan (OHIP) implemented a physician billing code to incentivize the adoption of telemedicine-delivered care across Ontario in all domains of medicine, including OAT.

As a treatment modality, telemedicine is practiced with the patient presenting at a secure videoconference site, usually located at a clinic under the supervision of a registered nurse, where they can be connected to a physician in a different location within the province. Importantly, all OAT-related practice guidelines (including observed dosing and urine screening) are employed with equal consistency and frequency for telemedicine or in-person patients. Telemedicine has become a mainstream method of delivering medical services in urban as well as rural areas (Brown, 2013; Liddy et al., 2013; O'Gorman and Hogenbirk, 2015; O'Gorman et al., 2016), and improvements to technology and bandwidth have benefited all regions.

Today, OAT is routinely delivered both in-person and via telemedicine across Ontario, yet the effectiveness of telemedicine-delivered OAT relative to in-person OAT has not been evaluated. In this study, we compare the effectiveness of in-person versus telemedicine-delivered OAT using one year of treatment retention as the primary outcome.

2. Methods

2.1. Clinical context

In the province of Ontario—in addition to the federal requirement for an exemption to prescribe methadone—OAT is regulated by formal treatment guidelines established by the provincial medical licensing body, the College of Physicians and Surgeons of Ontario (CPSO) (CPSO, 2011), which set out expectations with respect to physician practice and are enforced through peer-audits. For patients initiating OAT, daily observed dosing and regular urine screening occurs at a clinic, physician office, or pharmacy. Contingency management is part of the treatment strategy, and as a patient is stabilized on an effective dose of methadone, physicians can increase the number of carried doses as a positive reinforcement tool for abstinence from non-prescribed substance use. At the physician's discretion, and in alignment with the CPSO methadone practice guidelines, a stabilized patient can progress from one take home does to a maximum of six take-home doses per week over approximately six months of sustained psychosocial stability.

Variability of practice within the guidelines is possible, but limited. All treatment records were obtained from the Ontario Addiction Treatment Centers (OATC) network of clinics. Further consistency within the dataset arises from standardized policies and operating procedures within the clinic network, which limit the likelihood of variability of treatment. To maintain consistency, patients are typically seen by the same physician throughout the course of their treatment. Within the study cohort, it is possible that a physician may see patients from different clinics/communities, particularly if telemedicine is used.

2.2. Cohort definition

We conducted a retrospective cohort study of patients initiating OAT for the first time between January 1, 2011 and June 17, 2012 in the province of Ontario. We defined first time OAT as no previous history of either methadone or buprenorphine dosing within the clinic network since 1999. Patients started on methadone or buprenorphine and were allowed to transition between these medications over the course of treatment. Patients were at least 15 years or older (patients $<$ 18 years of age accounted for $<$ 1% of cohort) and were residents of Ontario. All patients were followed from their date of OAT initiation to the date of medication discontinuation, or end of the study period (June 17, 2013). Medication discontinuation was defined as 30 continuous days without a methadone or buprenorphine dose.

2.3. Data sources

The dataset used for this study was derived from anonymized electronic medical record database from a network of 58 OATC clinics across the province of Ontario. Methadone prescribing, treatment delivery, and data management are harmonized across the clinic network. Prior to data analysis, personal identifiers were replaced with an encrypted unique identifier.

2.4. In-person versus telemedicine classification

Patients were categorized as either predominantly in-person ($<$ 25% of physician encounters occurred by telemedicine), predominantly telemedicine ($>$ 75% of physician encounters occurred by telemedicine), or mixed ($\geq$ 25% and $\leq$ 75% of treatment via telemedicine). This classification arose due to the bi-modal distribution of the data. Very few patients receive the entirety of their treatment via one modality over another; most patients will receive some in-person or telemedicine interactions during their treatment. For example, an in-person patient may connect with their physician if either the patient or physician is traveling.

2.5. Definition of treatment retention

All patients were followed to treatment discontinuation or to the maximum follow-up date of June 17, 2013. Continuous OAT was assessed on the basis of having a dose within 30 days of their previous dose. We defined a patient as having been retained in treatment if they completed at least one year of continuous and uninterrupted OAT. Censoring during study period could potentially occur if patient was transferred to the correctional system, sought care outside of the clinic network, was hospitalized for more than one month, or if the patient died while in treatment.

2.6. Statistical analysis

We used descriptive statistics to characterize each of the patient groups. For the primary analysis, we used the Cox Proportional Hazard Model to characterize the risk of discontinuation over time across the three groups. The predominantly in-person group was defined as the comparator in all survival analyses. Only a patient's first-treatment episode was considered. Cox Proportional Hazard Regression analysis was performed with patient age, patient sex, clinic region (Northern Ontario/Southern Ontario − defined by geographic regions prescribed