



Full length article

Trends in engagement in the cascade of care for opioid use disorder, Vancouver, Canada, 2006–2016

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ARTICLE INFO

Keywords:

Cascade of care
Opioid use disorder
Opioid agonist therapy
Quality indicators
Addiction
Methadone
Buprenorphine/naloxone
Performance metrics

ABSTRACT

Background: A cascade of care framework has been proposed to identify and address implementation gaps in addiction medicine. Using this framework, we characterized temporal trends in engagement in care for opioid use disorder (OUD) in Vancouver, Canada.

Methods: Using data from two cohorts of people who use drugs, we assessed the yearly proportion of daily opioid users achieving four sequential stages of the OUD cascade of care [linkage to addiction care; linkage to opioid agonist treatment (OAT); retention in OAT; and stability] between 2006 and 2016. We evaluated temporal trends of cascade indicators, adjusting for socio-demographic characteristics, HIV/HCV status, substance use patterns, and social-structural exposures.

Results: We included 1615 daily opioid users. Between 2006 and 2016, we observed improvements in linkage to care (from 73.2% to 78.9%, $p < 0.001$), linkage to (from 69.2% to 70.6%, $p = 0.011$) and retention in OAT (from 29.1% to 35.5%, $p < 0.001$), and stability (from 10.4% to 17.1%, $p < 0.001$). In adjusted analyses, later calendar year of observation was associated with increased odds of linkage to care (Adjusted Odds Ratio [AOR] = 1.02, 95% Confidence Interval [CI]: 1.01–1.04), retention in OAT (AOR 1.02, 95% CI: 1.01–1.04) and stability (AOR = 1.03, 95% CI: 1.01–1.05), but not with linkage to OAT (AOR 1.00, 95% CI: 0.98–1.01).

Conclusions: Temporal improvements in OUD cascade of care indicators were observed. However, only a third of participants were retained in OAT in 2016. These findings suggest the need for novel approaches to improve engagement in care for OUD to address the escalating opioid-related overdose crisis.

1. Introduction

North America is facing a public health crisis from opioid-related morbidity and mortality. More than 42,000 people in the United States (U.S.) died from an opioid overdose in 2016, and it is estimated that over 2.5 million Americans have an opioid use disorder (OUD) (Seth et al., 2018). In Canada, some jurisdictions are facing similar overdose epidemics, largely as a result of illicitly manufactured fentanyl and related analogues (BC Coroners Service, 2018; Gomes et al., 2017). For example, in British Columbia (BC) there were over 1400 illicit drug overdose deaths in 2017 (30.1 deaths per 100,000 individuals), an almost three-fold increase from 2015 (BC Coroners Service, 2018).

Untreated OUD remains one of the major drivers of the present opioid overdose crisis. Indeed, despite the known benefits of opioid agonist therapy (OAT) with buprenorphine/naloxone or methadone in

reducing opioid-related morbidity and mortality (Connery, 2015; Degenhardt et al., 2011; MacArthur et al., 2012; Sordo et al., 2017), significant barriers to uptake and retention in OAT persist (Sharma et al., 2017). Accordingly, there remains an urgent need to expand access to OAT (Murthy, 2016; Nosyk et al., 2013; Socias and Ahamad, 2016), and scale-up has begun in some settings. Rigorously monitoring the progress of such initiatives will be critical to optimize their impact. Drawing from recent efforts to scale up access to antiretroviral therapy to curb the HIV epidemic, the cascade of care framework has been recently proposed as a potential tool to monitor care for substance use disorders (Socías et al., 2016; Williams et al., 2017). Therefore, the objective of this analysis was to empirically test the cascade of care framework as a tool to characterize temporal changes in engagement in care for OUD in Vancouver, Canada, between 2006–2016.

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2. Material and methods

2.1. Study setting

Vancouver is home to a large number of people who use/inject illicit drugs (PWUD/PWID), which has been estimated to be approximately 12,000 (Remis et al., 1998). During the 1990s, the city experienced an outbreak of HIV among PWID, which peaked in 1994–1996 (Hyshka et al., 2012). In response, provincial authorities adopted a multifaceted approach, including the scale up of harm reduction services (e.g., needle and syringe distribution programs, the first supervised injection site in North America), low-threshold addiction treatment programs (including OAT programs), and expansion of antiretroviral treatment coverage. As a result of these policies, the number of new HIV infections among PWID declined, and has remained low, particularly since 2008 (Montaner et al., 2014).

BC's OAT program was established in 1996, and rapidly expanded from less than 3000 enrolled individuals in 1996 to more than 19,000 in 2016 (Eibl et al., 2017; Office of the Provincial Health Officer, 2017). Medical care and prescription drugs received in the context of OAT are fully publicly funded for low-income residents; individuals who are not eligible for this benefit are responsible for paying for a percentage of the medication cost either through private insurance plans or out-of-pocket (Eibl et al., 2017). Both methadone and buprenorphine/naloxone can be prescribed by primary care physicians and dispensed through community-based pharmacies in a low-threshold OAT model (Nosyk et al., 2013). Methadone maintenance therapy (MMT) has historically been the standard of care for OUD in BC, and in 2016 over 80% of individuals on OAT in the province were on MMT (Office of the Provincial Health Officer, 2017). Buprenorphine/naloxone was introduced to the provincial drug formulary in 2010. Since then, the number of individuals receiving buprenorphine-based OAT has been steadily increasing, particularly after 2015 when buprenorphine/naloxone was added as regular health care benefit (i.e., no need to previously “fail” MMT) (Office of the Provincial Health Officer, 2017). During the study period, injectable OAT (i.e., diacetylmorphine and hydromorphone) was only available in research settings. In February 2014, a number of regulatory changes were introduced to BC's OAT program, including a change in the methadone formulation, and restrictions in pharmacy delivery services, which resulted in a number of concerns among OAT clients (McNeil et al., 2015; Socías et al., 2017).

2.2. Study design and population

Data for this study were drawn from two harmonized open and ongoing community-recruited prospective cohorts of over 2000 adult PWUD: the Vancouver Injection Drug Users Study (VIDUS) and the AIDS Care Cohort to Evaluate exposure to Survival Services (ACCESS). VIDUS consists of HIV-negative adults (i.e., ≥ 18 years old) who injected drugs in the month prior to enrolment and began recruitment in 1996. ACCESS started in 2005, and consists of HIV-positive adults who used illicit drugs (other than or in addition to cannabis) in the previous month. Individuals are recruited through snowball sampling and extensive street outreach in the greater Vancouver region. Average semi-annual follow-up rates for the two cohorts are approximately 70%.

Study procedures for the two cohorts are harmonized to allow for pooled analyses, and have been described in detail previously (Strathdee et al., 1998; Wood et al., 2008). In brief, after providing written informed consent, at baseline and semi-annually thereafter, participants undergo an interviewer-administered questionnaire, provide blood for HIV/HCV serological testing and HIV clinical monitoring as appropriate, and are examined by a study nurse. The questionnaire collects information on socio-demographic characteristics, drug use patterns, health care access and utilization, including HIV and addiction care, as well as other relevant social-structural exposures, such as housing status and criminal justice system exposure. Participants

received a \$30 honorarium at each study visit. The studies have received approval by the University of British Columbia/Providence Health Care Research Ethics Board.

For the present study, the analytic sample was restricted to participants enrolled between January 1, 2006 and December 31, 2016 who reported \geq daily non-medical opioid use (e.g., heroin, street methadone, street fentanyl, street oxycodone) in the past six months at the baseline interview (hereafter, daily opioid users). Participants with no baseline daily non-medical opioid use, but who reported subsequent daily non-medical opioid use during follow-up, were included from that time point forward.

2.3. Measures

Our primary outcome of interest was achievement of each of the four defined stages along the OUD cascade of care. Although no standardized definitions exist for these indicators, whenever possible we followed and adapted those recently proposed to track the quality of addiction (Socias et al., 2016; Williams et al., 2017) and HIV care (Nosyk et al., 2014). For each calendar year (from 2006 to 2016) we assessed the following indicators: (1) linked to addiction care (i.e., \geq one observation in a given calendar year where the participant reported being enrolled in any addiction treatment in the previous six months, including OAT, residential treatment, detox); (2) linkage to OAT [i.e., \geq one observation in a given calendar year where the participant reported being enrolled in OAT (methadone or buprenorphine/naloxone) in the previous six months]; (3) retained in OAT (i.e., \geq two observations in a given calendar year at least three months apart where the participant reported being enrolled on OAT); and (4) stable (i.e., no self-reported overdoses, no binge drug use and no fair/poor self-reported health due to drug use among participants retained in OAT in the calendar year). Participants with no reports of addiction treatment in a given calendar year were considered unlinked to care for that year. In this model, individuals need to have reached all previous stages in order to be eligible to achieve subsequent stages. That is, an individual cannot be retained in OAT, unless they were previously linked to OAT, which in turn requires to be linked to general addiction services. Individuals can also move from one stage to another (increasing or decreasing their engagement with addiction health services) over time.

Our primary explanatory variable of interest was calendar year of observation. We also considered other covariates that have been shown to influence engagement in healthcare among PWUD. These included: socio-demographic characteristics (age, sex, ethnicity, maximum educational attainment); drug use patterns (\geq daily cocaine injection, \geq daily crack use); co-morbidities (HIV and HCV infection); and social-structural exposures (homelessness, incarceration). All socio-demographic characteristics except for age were time-fixed at baseline; age was time-updated on July 1 of each year; and all other variables were time-updated and refer to the six-month period prior to the interview.

2.4. Missing data

Missing data was overall low, with a median number of one missed follow-up visit (interquartile range [IQR] 0–3) and $< 1\%$ of missing data for explanatory variables. During the study period, 147 (9.1%) participants died, and 13 (0.8%) were lost to follow-up.

2.5. Statistical analyses

As a first step, we conducted descriptive statistics to examine baseline characteristics of the entire sample. Then, percentages of participants at each stage of the cascade were determined, using as denominator the total population of daily opioid users who completed at least one follow-up visit in a given year. Temporal trends of the proportion of daily opioid users in each stage of the OUD cascade of care were investigated using the Cochran-Armitage test. Finally, we

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