Enhanced Multidisciplinary Care for Inner City Patients with High Acute Care Use: Study Protocol

Ginetta Salvalaggio[ab], *MSc, MD, CCFP*; Kathryn A. Dong[acd], *MD, MSc, FRCP(C)*; Elaine Hyshka[ae], *MA, PhD*; Lara Nixon[f], *MD, CCFP*; Karine J. Lavergne[ab], *PhD*; Jen Nichols[dg], *MD, MPH, FRCP(C)*; Meira Louis[dg], *MD, MSc, FRCP(C)*; Stacy Lee Lockerbie[f], *PhD*; Meagan Bristowe[f], *BSc*; Jane Leske[ad], *BA (Special)*; Rhonda J. Rosychuk[hi], *PhD, PStat*; Kelly Mrklas[fj], *MSc*; Shireen Surood[d], *PhD*; T. Cameron Wild[e], *PhD*

ABSTRACT

Objectives: Socioeconomically disadvantaged people living with addiction are underserved by traditional models of acute care despite high service utilization rates. In response to this shortfall, Edmonton's Royal Alexandra Hospital has launched a multidisciplinary consult team offering best practices in addiction stabilization, health promotion, harm reduction, social stabilization, and connection to community supports. We hypothesize that exposure to this multicomponent intervention will lead to improved use of health care resources compared to usual care. **Methods:** A parallel-group, pre/post longitudinal quasi-experimental design will compare patients exposed to the intervention at the Edmonton site to patients exposed to usual care at two Calgary acute care facilities. Eligible patients are recruited for study participation if they have unstable housing, no stable income, and/or are actively using alcohol or other drugs, and are 18 years or older. Administrative health and social service data for the period six months prior to and 12 months after study enrolment will be linked to a longitudinal survey dataset from baseline and follow-up survey data collected over the same time period. **Expected Outcomes:** The primary outcome is decreased emergency department use at 12 months post-enrolment. Secondary outcomes include stabilization/reduction of substance use, initiation of addiction treatment, and connections to primary care, housing, and income support. **Implications:** The future results of this study have the potential to inform the systematic development and implementation of acute care interventions in meeting the needs of inner city patients with addiction and/or social instability.

Objectifs : Les personnes défavorisées sur le plan socioéconomique vivant avec la dépendance sont mal desservis par les modèles traditionnels de soins de courte durée, malgré des taux élevés d'utilisation des services. En réponse à ce manque, l'Hôpital Royal Alexandra d'Edmonton a lancé une équipe multidisciplinaire de consultation offrant les meilleures pratiques en matière de stabilisation de la toxicomanie, de promotion de la santé, de réduction des méfaits, de stabilisation sociale, et de connexion en support communautaire. Nous émettons l'hypothèse que l'exposition à cette intervention multi-composante conduira à une meilleure utilisation des ressources en soins de santé par rapport aux soins habituels. **Méthodes :** Un groupe parallèle, pré/post-longitudinal de conception quasi expérimentale, permettra de comparer les patients exposés à l'intervention du site d'Edmonton à des patients exposés aux soins habituels de courte durée de deux établissements de Calgary. Les patients éligibles sont recrutés pour participer à l'étude si elles ont un logement instable, aucun revenu stable, et / ou sont activement en dépendance d'alcool ou d'autres drogues, et sont âgés de 18 ans ou plus. Les données des départements d'administration en services de santé, ainsi que ceux des services sociaux seront compilées pour la période de six mois avant et 12 mois après l'étude. Les inscriptions seront liées à un ensemble de données d'enquête longitudinale à partir des données de référence et le suivi des données d'enquête recueillies au cours de la même période. **Résultats attendus :** Le principal résultat attendu est une diminution de l'utilisation des services d'urgence après une période de 12 mois suivant l'inscription. Les résultats secondaires devraient comprendre une stabilisation / réduction de l'utilisation de substance, un début de traitement de la toxicomanie, et des accès aux soins primaires, au logement et au soutien du revenu. **Implications :** Les résultats futurs de cette étude ont le potentiel d'influencer le développement systématique et la mise en œuvre des interventions de soins de courte durée afin de répondre

Affiliations:[a]Inner City Health and Wellness Program, Royal Alexandra Hospital, Edmonton, Alberta, [b]Department of Family Medicine, University of Alberta, Edmonton, Alberta, [c]Department of Emergency Medicine, University of Alberta, Edmonton, Alberta, [d]Alberta Health Services, [e]School of Public Health, University of Alberta, Edmonton, Alberta, [f]Cumming School of Medicine, University of Calgary, Calgary, Alberta, [g]Department of Emergency Medicine, University of Calgary, Calgary, Alberta, [h]Department of Pediatrics, University of Alberta, Edmonton, Alberta, [i]Women & Children's Health Research Institute, Edmonton, Alberta, [j]Research Priorities and Implementation, Alberta Health Services, Calgary, Alberta

Please address correspondence to: Ginetta Salvalaggio, 8303 – 112 Street NW (610 University Terrace), University of Alberta, Edmonton, Alberta, Canada, T6G 2T4, Phone: (+1) 780-492-2890, Fax: (+1) 780-492-2593, ginetta@ualberta.ca

Conflicts of Interest and Source of Funding: This research is supported by grants from Alberta Innovates Health Solutions (AIHS) – Partnership for Research and Innovation in the Health System (PRIHS) and the Royal Alexandra Hospital Foundation (RAHF), RJR is salary supported by AIHS as a Health Scholar, EH received doctoral support from Alberta Innovates: Health Solutions and the Killam Trusts, KD receives a program director stipend from the RAHF via Alberta Health Services. The remaining authors have no conflicts to declare.

Keywords: Social Determinants of Health; Substance Use Disorders; Underserved Patients; Harm Reduction

aux besoins des patients du centre-ville avec une dépendance et / ou instabilité sociale.

INTRODUCTION

About 22% of Canadians will meet criteria for a substance use disorder (SUD) in their lifetime[1]. Substance misuse results in over 4 million acute care hospital days annually, 17% of premature mortality, and over $8 billion in direct health care costs[2,3]. People who are socioeconomically marginalized are at increased risk of SUDs. A recent study of 1191 unstably housed persons found that over half (53%) of participants met clinical criteria for a drug use disorder and more than one third (38%) met criteria for an alcohol use disorder[4]. Collectively, people whose substance misuse is compounded by poverty and/or unstable housing present to the emergency department (ED) more frequently and with higher illness acuity, and are less likely to be attached to primary care or chronic disease prevention and screening services[5,6,7]. Over half of Albertans who meet criteria for a SUD —as many as 86% of adults in one street-involved sample of people who use drugs—report unmet service needs, including counselling, information, social interventions, etc.[8].

Many jurisdictions have implemented models to improve care access and quality for marginalized patients experiencing addiction. Harm reduction service models, such as syringe exchange and managed alcohol programs, meet immediate health needs and facilitate service linkage[9]. Community Health Centres, and similar adaptations of the Patient-Centered Health Home model, provide comprehensive multidisciplinary services to improve relational continuity of care[10,11]. Case management models, such as Housing First, target medically and socially complex patients to deliver social supports, health service navigation and care coordination[12,13].

Each of these service models has demonstrated improved outcomes but have limited reach in acute care settings. This is problematic, as hospital admissions provide an important opportunity to engage underserved populations and facilitate uptake into comprehensive SUD services and other supports[14,15]. Some Canadian hospitals offer addiction medicine services, but SUD services are typically only provided to assist with short-term stabilization under an abstinence-oriented approach. Often, these services do not provide comprehensive social supports, or connections with primary care and outreach services[8]. Enhanced discharge planning and case management can aid community-based and longitudinal follow-up for patients after discharge, but target population penetration is limited by necessarily small, intensive caseloads. Moreover, hospitals in Canada have yet to meaningfully integrate comprehensive harm reduction services into inpatient care; evidence suggests that constrained access to these interventions may contribute to increased drug-related risk behaviours and early leaving against medical advice[16,17].

Preliminary findings from an earlier needs assessment of homeless and/or substance using patients presenting to the RAH ED support the need for innovative service models to address unmet needs of inner city patients in acute care[18]. In this earlier needs assessment sample of 164 patients, many were attempting to reduce alcohol consumption (63.4%) and drug consumption (45.3%). Some listed their primary reason for visiting the ED as lack of food (4.9%), lack of shelter (3.7%), or concern for safety (9.3%). Only 60% of substance-using or unstably housed respondents had a family physician, compared to 75.6% of comparison patients. Most respondents reported interest in accessing support in the ED for additional unmet needs including assistance booking follow-up appointments, help with housing, and addiction and mental health counselling.

In response to these unmet needs, we convened front-line and administrative stakeholders, representing Edmonton's health and social services, police, government, academic, patient groups, and non-profit sectors, to discuss how acute care services could respond. Participants recommended incorporating social determinants of health and addiction medicine perspectives into traditional medical approaches. Of equal priority was improved inter-provider, patient and systems communication, and community-based supports.

OBJECTIVES

To determine if enhanced multidisciplinary care for an inner city population accessing acute care results in improved health care resource use, social stability, and health status compared to usual care. We hypothesize that exposure to an acute care-based team intervention will demonstrate an absolute 20% reduction in heavy ED use compared to usual care.

METHODS

OVERVIEW

A parallel-group, pre/post longitudinal quasi-experimental design, with baseline, six-, and 12-month follow-up assessments will be used to test the study hypothesis.

To ensure stakeholder and patient support, facilitate community linkages, and increase the likelihood of institutionalization if the intervention is demonstrated to be effective, we employed a community-based participatory research approach[19,20]. Community-based participatory research emphasizes the participation of the population of interest throughout the research process, adopts the methodology most suited to the community's research needs (qualitative, quantitative, or mixed methods), and commits to acting on generated knowledge. Past acute care patients and inner city community members (via a Community Advisory Group) are actively involved with the program design and delivery, clinicians and staff are program advocates, and numerous alignments between stakeholders (health and social services, government, non-profit and academic sectors) are being established as part of program implementation. Establishing and maintaining these relationships, and identifying key advocates in these stakeholder groups are significant core parts of the research strategy. Although the patient outcomes evaluation described herein requires a quantitative approach, it is complemented by a primarily qualitative process evaluation to ensure patient perspectives on possible mechanisms for intervention effectiveness are equally well documented.

This study was approved by the University of Alberta Health Research Ethics Board-Panel B as well as the University of Calgary Conjoint Health Research Ethics Board.

SAMPLE

Pilot data suggest 50% of patients with unstable housing or acute substance use are high ED users[19]. The study is powered to detect an absolute 20% reduction in heavy ED use by the target population over the study period, requiring 103 participants in each study arm (two-sample test of proportions, $\alpha = 0.05$, power = 80%)[21]. With local experience of up to 50% attrition over a similar follow-up period and 30% administrative data validation concerns for this hard-to-reach group[22], the study protocol will recruit 300 individuals from participating acute care sites into each study arm.

The intervention group is recruited from patients exposed to enhanced multidisciplinary care at the Edmonton RAH site. The eligible population accesses the ED an estimated 9000 times yearly (14% of total ED visits), offering an adequately sized recruitment pool. The comparison group is composed of patients exposed to usual acute care at two Calgary sites. The Peter Lougheed Centre and Sheldon Chumir Centre serve a similarly disadvantaged population as the RAH, maximizing the potential for baseline equivalence of patients enrolled in each arm of the study. In the year prior to this study, these two Calgary sites collectively saw over 5500 visits by over 1500 unique patients with "no fixed address" listed as residence. When additional intervention-eligible patients with a specified address are included, the combined Calgary recruitment pool is comparable to that at the RAH.

PROCEDURES

Eligibility criteria. Patients are eligible for study participation if they are unstably housed, have no stable income, and/or are actively using alcohol or other drugs. 'Unstably housed' is defined as individuals who are absolutely homeless (having no housing alternatives) or sheltered homeless (living in temporary accommodations such as a friend's place or an emergency shelter, but expected to be 'on the street' after hospitalization). 'No stable income' is defined as lack of a regular monthly income in the form of employment, disability allowance, pension, or other fixed income support. 'Actively using substances' is defined as the excessive use of alcohol (above Canadian low-risk drinking guide threshold) or any non-therapeutic use of drugs (not prescribed by a doctor or not taken as prescribed) in the past 30 days. Patients are excluded if they are < 18 years old, unable to speak and understand English, medically or cognitively unstable (as deemed by a qualified health care professional) during recruitment, unable to give informed consent, or incarcerated or under police supervision during recruitment.

Recruitment procedures. Intervention site patients meeting eligibility criteria are offered a referral to the intervention team by ED and adult inpatient unit staff (e.g., medicine, surgery, women's health). An inner city clinical team member informs patients that a research team member will approach them about the study. At the comparison sites, patients who present to either site for acute or urgent care are identified by chart data or front-line staff and then approached by a member of the research team after initial clinical assessment. A research assistant confirms eligibility, explains the research project, and administers an informed consent protocol, which includes patient consent to collect survey data, access administrative data, and link data sources. Additionally, as much contact information as possible (phone numbers, email addresses, name of outreach workers services used) is obtained in order to reach participants to collect longitudinal data.

Primary data collection. After informed consent is obtained, the research assistant administers a baseline structured quantitative survey. Study staff attempt to contact participants via phone (or the best method suggested by the participant at the time of enrolment) at six months and 12 months after baseline data collection to complete a follow-up survey. If unsuccessful, to minimize attrition, a community outreach worker with extensive knowledge of and familiarity with the inner city community assists with locating participants. This is an established follow-up recruitment process for longitudinal

studies of people who use drugs or are unstably housed or homeless, effective both locally22 and in ongoing open cohort studies in Vancouver, BC[23,24].

Secondary data collection. Anticipating that some participants will be lost to in-person follow-up, administrative data on participant health service linkage and utilization, access to housing, and income support will be accessed from Alberta Health Services, Alberta Human Services, Homeward Trust, and the Calgary Homeless Foundation. The research team will submit requests for administrative data on consenting research participants for the period of six months prior to, and 12 months after enrolment, sharing a data key containing personal identifiers and partner-specific participant ID numbers with each data partner. Staff at each organization will compile a dataset on identified program participants. Data with study IDs only will be returned to the research team. After de-identification, the research team will securely link data from primary and administrative sources by study ID.

Survey data collection is ongoing at intervention and comparison sites; administrative data pulls are also underway.

INTERVENTION

The multicomponent intervention team is provided by a rotating group of physicians with expertise in addiction medicine available from 0800 – 2100 daily, and a full-time nurse practitioner, social worker, addiction counsellor, and peer support worker. The team functions as a specialty consult service, and is available to any patient in the ED or inpatient units. Any member of the patient's clinical care team can initiate a consult. The team also runs a transitional clinic to bridge patients from acute care to secure attachment with community-based or primary care. Two next-day appointments are available during regular weekdays for patients discharged from the ED.

The intervention is unique from traditional hospital-based addiction medicine services because it combines treatment, harm reduction, and links to appropriate community health and social supports into one service (Table 1). The team intervention comprises (1) in-hospital addiction stabilization, harm reduction (syringe exchange, naloxone distribution), mental health support, and chronic disease prevention and screening services until patients can be linked to appropriate community-based services; (2) brokered access for patients to more cost-effective care environments (i.e. primary care, addiction and mental health services); and (3) care coordination and discharge planning, including arranging for housing intake and links to other community services.

MEASURES

The primary health service utilization outcome of interest is the proportion of participants with high ED use (>two visits/six months) at 12 months post-enrolment. These data will be obtained from the administrative health dataset.

The secondary outcomes will be assessed using a wide range of variables to assess changes in substance use, healthcare use, health status, and social determinants of health over the 12 months following baseline. The data will be obtained both from the survey assessments, which include validated instruments and single-item measures, and from our various administrative data partners. Table 2 provides a complete list of expected secondary outcomes and the corresponding variables, along with the data sources used (full baseline survey instrument available at https://crismprairies.ca/resources/tools/service_evaluation/arch-team-patient-outcome-evaluation-survey-v6/).

Finally, several additional measures of potential covariables have been included in the survey or will be retrieved from our administrative data partners, such as population-relevant covariates and demographic variables. These variables are important to identify and characterize baseline differences between the two groups.

ANALYSIS

Data will be described by numerical and graphical summaries. Data at baseline, six months, and 12 months will be summarized separately and the change from baseline to 12 months will be calculated. Group differences will be tested using the z test of proportions for the primary outcome and Chi-squared tests of association for other categorical outcomes. Analyses of intervention effects will be adjusted for any baseline differences detected between groups. Separate mixed effects regression models for each outcome (generalized linear mixed models for primary outcome) will be formed to test the intervention effect while adjusting for multiple data collection points (random effect for subject) and potential covariates. All analyses will be conducted in a statistical package to facilitate data analysis (e.g. glmmPQL(), lme())[25].

DISCUSSION

The implications of an effective linkage between acute care and community services are manifold. Acute care clinicians may be unaware of the community options available to this population, and are poorly equipped to address the challenges patients face in accessing them. An acute care service that bridges these different supports is more likely to link patients to services tailored to their particular needs; currently available services therefore become accessible to the right patients with minimal investment of acute care resources or service overlap.

Acute care visits can serve as a springboard for ongoing reduction in substance use and associated harms. Fewer subsequent expensive, and often recurrent, acute care visits would allow for resources to be reallocated to community-based addiction treatment, harm reduction, and primary and preventive care for this population. Importantly, these gains support currently validated, but under-subscribed, community interventions.

To our knowledge this is the first study to evaluate the benefits of implementing harm reduction services into a Canadian inpatient acute care setting. Based on previous research examining illicit drug use in acute care settings, participants who receive access to inpatient harm reduction services may be less likely to leave against medical advice, and be readmitted less frequently[16,17]. Furthermore, providing opioid overdose prevention training and take home naloxone kits to inpatients may provide a valuable opportunity to reach segments of the illicit drug using population who are not in contact with existing harm reduction programs in the community. If proven effective, our findings will help lay the foundation for the development of inpatient harm reduction programs in other settings in Canada, and internationally.

The intervention is endorsed by RAH site administration, but its uniform adoption as a hospital resource by front-line health care providers depends on work environment factors and community capacity. Key front-line issues that have arisen include: lack of knowledge and/or comfort with harm reduction approaches; need for culture change (i.e. refuting active drug use as a reason for immediate discharge); dealing with the "out of scope" argument (i.e. "It's my job to treat the pneumonia not to find the patient housing"); and concern that the intervention would attract more "difficult" patients to the hospital. These implementation barriers were addressed in numerous ways: an intervention-aligned organizational Policy on Harm Reduction and a related memo from the site Medical Director; other professional association documents on harm reduction (i.e. nursing); mobile unit-by-unit education sessions; clinical ethicist support on multiple cases indicating that discharge would be dangerous and unethical; and early wins when front-line staff observed patients stabilizing both medically and socially and re-presenting to the RAH less frequently.

We prioritized health team engagement while developing and implementing this innovative service, and will continue to do so through transition and sustainability phases. Best practice in program implementation will be key to successfully integrating the clinical team into existing hospital services. A knowledge broker is aiding health teams on referring hospital units to effectively use the service innovation and adapt it to unit needs. The program is also engaged in discussions to ensure site-level integration of the initiative. A primarily qualitative process evaluation, performed in parallel with the patient outcomes evaluation protocol, will capture the intervention's impact on stakeholders both within and external to the care facility. Extant implementation barriers and facilitators documented via this process evaluation will be mapped onto a validated implementation framework; mapping will permit a systematic approach to designing resolution strategies for the intervention team and other teams wishing to scale the intervention.

LIMITATIONS

A randomized controlled study would be a stronger design for testing our hypothesis; however, implementing enhanced multidisciplinary care for the target population constitutes a complex health intervention necessitating an acute care system redesign. As such, randomization at the level of the individual program participant is not feasible. An alternative design is cluster randomization to intervention versus control services by site; unfortunately, this would require a large pool of comparable study sites (at least 14), which is not feasible in a single province for the intervention.

CONCLUSION

Our multidisciplinary team acute care intervention offers treatment of SUDs in conjunction with social stabilization and linkage to community-based care. It provides opportunities to positively impact patient outcomes over the long term. Reductions in substance, alcohol, and tobacco use, reductions in traumatic injuries, higher quality care, fewer hospitalizations for acutely decompensated medical conditions, and reductions in ED utilization, if observed, are examples of the intervention's potential to enhance the overall health and well being of our target population and translate health system investments into cost savings.

ACKNOWLEDGEMENTS

We are grateful to Chris McCabe, Andrew McRae, Judith Krajnak, Klaudia Dmitrienko, Shanell Twan, Chelsea Burnham, and our community advisory group for their

contribution to study design. Thank you to Rachel Ward and summer students for their assistance with data collection. Thank you to the Alberta Health Sciences-Addiction and Mental Health Strategic Clinical Network for assistance with stakeholder engagement. Thank you also to our data custodians, and health and social sector stakeholders for partnering on this study, and to the ARCH clinical team for intervention implementation.

REFERENCES

1 Pearson C, Janz T, & Ali J. Health at a Glance: Mental and substance use disorders in Canada. Ottawa, Canada: Statistics Canada, 2013. (Statistics Canada Catalogue No. 82-624-X; Accessed October 29, 2015, at http://www.statcan.gc.ca/pub/82-624-x/2013001/article/11855-eng.pdf.)

2 Patra J, Taylor B, Rehm JT, Baliunas D, & Popova S. Substance-attributable morbidity and mortality changes to Canada's epidemiological profile: Measurable differences over a ten-year period. Can J Public Health 2008;98(3):228–34.

3 Rehm J, Adlaf E, Recel M, & Single E. The costs of substance abuse in Canada, 2002. Ottawa, Canada: Canadian Centre on Substance Abuse, 2006. (Accessed October 29, 2015, at www.ccsa.ca/Resource%20Library/ccsa-011332-2006.pdf.)

4 Palepu A, Gadermann A, Hubley AM, et al. Substance use and access to health care and addiction treatment among homeless and vulnerably housed persons in three Canadian cities. PloS One 2013;8(10):e75133.

5 Hwang SW, Weaver J, Aubry T, & Hoch JS. Hospital costs and length of stay among homeless patients admitted to medical, surgical, and psychiatric services. Med Care 2011;49(4):350-4.

6 Chitwood DD, McBride DC, French MT, & Comerford M. Health care need and utilization: a preliminary comparison of injection drug users, other illicit drug users, and nonusers. Subst Use Misuse 1999;34(4-5):727-46.

7 Palepu A, Strathdee SA, Hogg RS, et al. The social determinants of emergency department and hospital use by injection drug users in Canada. J Urban Health 1999;76(4):409-18.

8 Wild TC, Wolfe J, Wang J, & Ohinmaa A. Gap Analysis of Public Mental Health and Addictions Programs: Final Report. Edmonton, Canada: Government of Alberta, 2014. (Accessed October 29, 2015, at www.health.alberta.ca/documents/GAP-MAP-Report-2014.pdf.)

9 Carter CI, & MacPherson D. Getting to Tomorrow: A Report on Canadian Drug Policy. Vancouver, Canada: Canadian Drug Policy Coalition, 2013. (Accessed October 29, 2015, at http://drugpolicy.ca/report/CDPC2013_en.pdf.)

10 College of Family Physicians of Canada (CFPC). A Vision For Canada: Family Practice—the Patient's Medical Home. Mississauga, Canada: CFPC, 2011. (Accessed October 29, 2015, at http://www.cfpc.ca/A_Vision_for_Canada_Family_Practice_2011/.)

11 Kringos DS, Boerma WG, Hutchinson A, van der Zee J, & Groenewegen PP. The breadth of primary care: a systematic literature review of its core dimensions. BMC Health Serv Res 2010;10(1):65.

12 Goering PN, Streiner DL, Adair C, et al. The At Home/Chez Soi trial protocol: a pragmatic, multi-site, randomised controlled trial of a Housing First intervention for homeless individuals with mental illness in five Canadian cities. BMJ Open 2011;1(2):e000323.

13 De Vet R, van Luijtelaar MJA, Brilleslijper-Kater SN, Vanderplasschen W, Beijersbergen MD, & Wolf JRLM. Effectiveness of Case Management for Homeless Persons: A Systematic Review. Am J Public Health 2013;103(10):e13-26.

14 O'Toole TP, Pollini RA, Ford DE, & Bigelow G. The Effect of Integrated Medical-Substance Abuse Treatment during an Acute Illness on Subsequent Health Services Utilization. Med Care 2007;45(11):1110–5.

15 Holt SR, Ramos J, Harma MA, et al. Prevalence of Unhealthy Substance Use on Teaching and Hospitalist Medical Services: Implications for Education. Am J Addict 2012;21(2):111–9.

16 McNeil R, Small W, Wood E, & Kerr T. Hospitals as a "risk environment": An ethno-epidemiological study of voluntary and involuntary discharge from hospital against medical advice among people who inject drugs. Soc Sci Med 2014;105:59–66.

17 Ti L, Buxton J, Harrison S, et al. Willingness to access an in-hospital supervised injection facility among hospitalized people who use illicit drugs. J Hosp Med 2015;10(5):301–6.

18 Dong K, Cooper R, Salvalaggio G, et al. Needs Assessment Survey Of Homeless And/Or Substance Using Adults Presenting To The Emergency Department. Can J Emerg Med 2013 15(1S): S71.

19 Macaulay MC, Commanda LE, Freeman WL, et al. Participatory research maximises community and lay involvement. BMJ 1999;319(7212):774–8.

20 Cargo M, & Mercer S. The Value and Challenges of Participatory Research: Strengthening Its Practice. Annu Rev Public Health 2008;29:325-50.

21 Hintze JL. PASS 2008. Kaysville, UT: NCSS LLC, 2008. (Accessed October 29, 2015, at http:// ncss.wpengine.netdna-cdn.com/wp-content/uploads/.../PASSUG1.pdf.)

22 Salvalaggio G, Dong K, Vandenberghe C, et al. Impact of Patient Engagement Resources on Satisfaction With Care for Disadvantaged Patients Who Use Alcohol or Drugs. Family Medicine 2013;45(Suppl2).

23 Kerr T, Small W, Buchner C, et al. Syringe Sharing and HIV Incidence Among Injection Drug Users and Increased Access to Sterile Syringes. Am J Public Health 2010;100(8):1449-53.

24 DeBeck K, Kerr T, Li K, et al. Smoking of crack cocaine as a risk factor for HIV infection among people who use injection drugs. CMAJ 2009;181(9):585-9.

25 R Core Team. R: A Language and Environment for Statistical Computing Version 3.1. Vienna, Austria: R Foundation for Statistical Computing, 2014. (URL http://www.R-project.org/)

26 Bush K, Kivlahan DR, McDonell MB, Fihn SD, & Bradley KA. The AUDIT alcohol consumption questions (AUDIT-C): an effective brief screening test for problem drinking. Arch Intern Med 1998;158(16): 1789-1795.

27 Voluse AC, Gioia CJ, Sobell LC, Dum M, Sobell MB, & Simco ER. Psychometric properties of the Drug Use Disorders Identification Test (DUDIT) with substance abusers in outpatient and residential treatment. Addict Behav 2012:37(1):36-41.

28 Canadian Institute for Health Information (CIHI). Continuity of Care With Family Medicine Physicians: Why It Matters. Ottawa, Canada: CIHI, 2015. (Accessed November 11, 2015, at https://secure.cihi.ca/free_products/UPC_ReportFINAL_EN.pdf.)

29 Meadows G, Harvey C, Fossey E, & Burgess P. Assessing perceived need for mental health care in a community survey: development of the Perceived Need for Care Questionnaire (PNCQ). Soc Psychiatry Psychiatr Epidemiol 2000;35(9);427-35.

30 Löwe B, Kroenke K, & Gräfe K. Detecting and monitoring depression with a two-item questionnaire (PHQ-2). J Psychosom Res 2005;58(2):163-71.

31 Herdman M, Gudex C, Lloyd A, et al. Development and preliminary testing of the new five-level version of EQ-5D (EQ-5D-5L). Qual Life Res 2011;20(10):1727-36.

TABLE 1. COMPONENTS OF TEAM INTERVENTION.

Category	Activities
Addiction stabilization	Withdrawal management
	Intoxication management
	Brief intervention
	Tobacco cessation counseling / pharmacotherapy
	Opioid agonist therapy
	Referral to treatment
Harm reduction	Acute pain management
	Harm reduction counseling
	Harm reduction supplies
	Overdose prevention training
Health promotion	Infectious disease screening
	Contraception counseling / provision
	STI prevention counseling
	Chronic disease screening (e.g. diabetes)
Social stabilization	Housing intake / intervention
	Income support application / intervention
	Assistance with obtaining ID
	Application for medication coverage
	Consolidation of legal issues
	Counseling re food security
	Transportation assistance
Community linkage	Primary care
	Outpatient addiction counseling / treatment
	Outpatient mental health counseling / treatment
	Outreach / peer support
	Aboriginal cultural helper referral

TABLE 2. EXPECTED SECONDARY PATIENT OUTCOMES WITH CORRESPONDING VARIABLES AND DATA SOURCES.

Expected Outcome	Variable	Data source
Stable/Reduced Substance Use	Stable/reduced alcohol intake[a]	Survey
	Stable/reduced drug intake[b]	Survey
	Stable/reduced tobacco intake	Survey
	Uptake into addiction treatment	Survey/Health Services[c]
	Uptake into opioid agonist therapy	Survey
	Decreased substance use-related risk behaviours	Survey
Uptake of preventive care	Contraception	Survey
	Sexually transmitted infection (STI) prevention	Survey
	STI/Blood-borne virus screening	Survey/Health Services[c]
Improved continuity of care	New primary care attachment	Survey/Care provider[c]
	Reduced number of emergency department presentations for family practice care sensitive conditions[d]	Health Services[c]
	Reduced premature leaving from the hospital	Health Services[c]
Improved social determinants of health	Stable housing	Survey/Human Services[c]
	Stable income	Survey/Human Services[c]
	New valid identification	Survey
	New medication coverage	Survey
	New support worker attachments	Survey/Support agency[c]
	Reduced criminal activity	Survey
	Reduced crime victimization	Survey
Improved overall health	Reduced unmet need for care[e]	Survey
	Fewer symptoms of depression[f]	Survey
	Improved health-related quality of life[g]	Survey
	Reduced incidence of traumas and injuries	Health Services[c]
	Reduced hospitalization	Health Services[c]

[a]As measured by the Alcohol Use Disorders Identification Test – Consumption (AUDIT-C)[26].
[b]As measured by an abbreviated version of the Drug Use Disorders Identification Test (DUDIT)[27].
[c]Refers to an administrative data partner.
[d]A continuity of care indicator used in previous research[28].
[e]As measured by the Perceived Need for Care Questionnaire (PNCQ)[29].
[f]As measured by the Patient Health Questionnaire-2 (PHQ-2)[30].
[g]As measured by the EQ-5D[31].