Integrating Hospital and Community Care for Homeless People with Unmet Mental Health Needs: Program Rationale, Study Protocol and Sample Description of a Brief Multidisciplinary Case Management Intervention

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ABSTRACT

The Coordinated Access to Care for Homeless People (CATCH) program is a brief multidisciplinary case management intervention for homeless adults discharged from hospital in Toronto, Canada. Here we describe the rationale for CATCH program development, details of the mixed methods evaluation underway, and the characteristics of 225 CATCH service users. Funded in 2010 by the local health authority, CATCH aimed to improve access, continuity of care, health and service use outcomes for homeless adults discharged from hospital. To assess the feasibility, acceptability and impact of the program, a mixed-methods case study was undertaken in 2013. In total, 225 CATCH program users were enrolled in the study and completed quantitative survey measures at program entry to assess key health and social outcomes using a pre-post cohort study design. Follow-up assessments took place at 3- and 6-months. At study entry, most participants were male (79%), white (65%), Canadian-born (74%), single or never married (60%), and their average age was 39.9 ± 12.0 years. Nearly all participants (88%) had at least one emergency department visit in the past six months, more than half (53%) indicated at least three chronic health conditions, and 44% indicated at least three mental health diagnoses. In addition, qualitative data was collected to evaluate the experiences of continuity of care and challenges during care transitions for this population using in-depth interviews with a sample of CATCH service users (n=22) and managers of partnered organizations (n=7), as well as focus groups with CATCH staff (n=8), other service providers (n=7) and people with lived experience of homelessness (n=8). Improving health and health service use outcomes among homeless adults with chronic health conditions are key priorities in many jurisdictions. Future findings can inform service delivery to homeless adults discharged

from hospital, by exposing factors associated with positive program outcomes, as well as barriers and facilitators to continuity of care for this disadvantaged population.

KEYWORDS

Case management, homeless people, mental illness, health status, health service use, care transitions.

Supporting the timely transition of care from acute to community-based services and implementing interventions integrating health and social care are system priorities in many jurisdictions (Baker 2011). In the province of Ontario, initiatives such as Health Links have been put into practice to better coordinate services for people with complex needs, often served by several providers and sectors and experiencing service gaps and duplications (Ministry of Health and Long-Term Care 2012b, 2012a). Among people with complex health and social needs, individuals experiencing homelessness merit particular attention. Compared to the general population, homeless people experience higher rates of mental illness, addictions, cognitive impairment and chronic health conditions (Hwang 2001; Fazel et al. 2014; Stergiopoulos et al. 2015). They also face several barriers to accessing appropriate health care (Hwang 2001; Fazel et al. 2014; Salize et al. 2013), and correspondingly, have high rates of hospital and social service use, at substantially greater costs, compared to the general population (Hwang et al. 2011; Bharel et al. 2013). Despite a system of universal health insurance, homeless people in Canada experience persisting access barriers related to system fragmentation, limited capacity of existing services, stigma and discrimination (Lewis 2015; Asada & Kephart 2007). This is concerning, given that the rates of homelessness in Canada continue to rise, with over 235,000 people experiencing homelessness each year (Gaetz et al. 2016).

Hospital inpatient and emergency department (ED) settings offer opportunities to engage homeless people in care and decrease their risk of poor health and social outcomes (Herman et al. 2007; Fontanella et al. 2014). Strategies that bridge hospital and community-based services for this population are therefore urgently needed. One such model, Critical Time Intervention (CTI), was originally developed as a time-limited case management intervention to reduce the

risk of homelessness among people leaving shelters; it has since been implemented in a variety of settings, including hospitals (Herman et al. 2011). The CTI model connects individuals with mental illness to a case manager at the point of discharge from institutional to community settings. Individuals are followed for a transition period of up to 9-months, during which their case managers provide emotional and practical support and establish long-term ties to needed health and social services (Susser et al. 1997; Herman et al. 2007).

The CTI model has been shown to successfully reduce homelessness (Susser et al. 1997; Herman et al. 2011; Lennon et al. 2005) and improve a variety of other outcomes. Randomized controlled trials (RCTs) have identified reductions among CTI participants, compared to usual care participants, in negative psychiatric symptoms (Herman et al. 2000), alcohol and drug use problems, costs (Jones et al. 2003) and psychiatric hospitalizations (Tomita & Herman 2012). Additional non-randomized studies have identified decreased days in institutions and alcohol and drug use problems (Kasprow & Rosenheck 2007). Furthermore, CTI interventions appear to improve continuity of care, which can be broadly defined as the degree to which the ongoing health care received by an individual is connected over time and consistent with their needs and circumstances (Fortney et al. 2003; Haggerty et al. 2003; Tomita & Herman 2015).

Although the evidence supporting CTI is mounting in the US, outcomes of past studies may not be generalizable to diverse service delivery contexts. Additionally, little is known of the effectiveness of other brief interventions, adapted to their local contexts, or the effect of such interventions on participants' health status and quality of life. Finally, the impact of brief interventions on continuity of care requires further investigation.

The goal of this article is to: first, describe the rationale for the Coordinated Access to Care for Homeless People (CATCH) program, a brief multidisciplinary case management intervention for homeless people presenting to hospital in Toronto, Canada; second, outline a mixed methods case study (Stake 2005) evaluating the program; and third, describe the characteristics of program's service users at study entry. This information may be helpful to other urban centers facing similar challenges. Future articles will focus on longitudinal program outcomes as well as experiences of continuity of care in the context of this brief intervention.

METHODS

CATCH program rationale

Toronto is home to the largest cohort of homeless people in Canada, with over 5,000 people experiencing homelessness on any given night, based on a point-prevalence survey (City of Toronto Shelter Support and Housing Administration 2013). Despite a plethora of primary care, health and social services, including a variety of mental health and homelessness services, a 2007 survey of more than 350 homeless adults in Toronto found that in the past year, 54% had been to the emergency department at least once, 24% had been hospitalized for at least one night and 29% had no usual source of health care (Khandor & Mason 2007). Furthermore, survey data collected from 1981 (40%) of 5006 homeless individuals enumerated as part of Toronto's point-prevalence survey indicated that nearly half (43%) perceived that receiving help in addressing health concerns would support their housing stability (City of Toronto Shelter Support and Housing Administration 2013). Aiming to better integrate health and social care, improve continuity of care and ultimately health and health service use outcomes among adults

experiencing homelessness, the local health authority funded the CATCH program in 2010.

Informed by the CTI model, CATCH is a brief multidisciplinary case management intervention for homeless people discharged from hospital and lacking access to appropriate community supports.

Program description

CATCH provides “one-stop” services including primary and psychiatric care, peer support and brief case management (4-6 months) to homeless people discharged from hospital (Susser et al. 1997). The program offers weekly low barrier clinics staffed by a nurse, a primary care physician and two psychiatrists, working seamlessly with case managers to complete multidisciplinary assessments and develop comprehensive care plans addressing health, mental health and social needs. CATCH is a partnership of 3 local hospitals, providing infrastructure and support, a large community mental health agency, providing case management, a homeless shelter, facilitating nursing care, a consumer driven agency, providing peer support, and a physician practice plan, supporting recruitment and remuneration of physicians with expertise in homeless health. Case managers have access to regular supervision through their home agency. Additional program partnerships with community health centers, social services, and other community agencies facilitate timely access to income supports, longer-term case management and access to a wide range of health and social supports available in the local community.

To achieve program goals, CATCH case management activities include community visits and assertive outreach, crisis intervention, supportive therapy and assistance in obtaining income supports and housing. Case managers introduce participants to new service providers, develop

comprehensive care plans with members of the multidisciplinary team (including team physicians) and participate in monthly multidisciplinary and cross-sectoral team meetings.

Study design

A mixed methods case study design was used to evaluate CATCH and capture an in-depth understanding of the program's uniqueness and complexity (Stake 2005).

The quantitative component of the CATCH evaluation used an observational pre-post study design. Interviews with participants included several quantitative survey instruments at study baseline and 3- and 6-months post-study enrollment. The primary quantitative outcome was overall health status, while secondary outcomes included acute health care service use (using both self-reported and administrative data records), housing, mental health, substance use and quality of life. For administrative health service use outcomes, additional analyses will include an appropriate comparison group of homeless adults living in Toronto. Additional data was collected by program case managers who completed monthly questionnaires regarding participants' service use and continuity of care.

The qualitative component of the evaluation consisted of in-depth semi-structured interviews and focus groups with key stakeholders. Qualitative interview and focus group guides were developed which explored barriers and facilitators to continuity of care experienced by this population and the timeliness, appropriateness, comprehensiveness and responsiveness of the intervention to service user needs and preferences. To increase validity of study findings, we aimed for data source, investigator and methodological triangulation (Rothbauer 2008). We also

aimed to provide a “think description” of the CATCH program, to facilitate understanding of the case and increase trustworthiness of the data (Stake 2005).

Participant recruitment, data collection and analytic methods for both the quantitative and qualitative data components of the evaluation are described in greater detail below. **Table 1** summarizes both quantitative and qualitative data sources.

I. Quantitative data component

Participant recruitment and eligibility

CATCH program participants were referred to a program coordinator from participating hospitals or a community agency, following hospital discharge. Program eligibility criteria included: 1) current homelessness (defined as living on the street or in a crisis/emergency shelter); 2) unmet physical or mental health needs as identified by health providers; and 3) unmet support needs, as identified by participants. Participants were excluded if they demonstrated aggressive behavior requiring higher intensity of support or illness severity necessitating residential care. In addition to meeting criteria for the CATCH program, study participants were required to meet the following criteria: 1) ≥ 18 years of age; 2) not had prior receipt of CATCH services in the past 12 months; and 3) at least one contact with a CATCH case manager. Participants indicating that they would be leaving the province within 2 weeks of program enrolment were excluded from this study. A study flow diagram is found in **Figure 1**.

Data collection

Participants met with research staff for a baseline interview and additional follow-up interviews at 3- and 6- months following program enrollment. All baseline interviews were completed within 2 weeks of program enrollment. A 4-week data collection window (up to two weeks' prior or two weeks after the 3- or 6-month time point) was allowed for 3- and 6-month visits. Each face-to-face interview lasted approximately an hour. Participants received an honorarium of \$25 for each interview.

At the baseline interview, study participants were asked to provide names and phone numbers of family and/or acquaintances (with consent) to help minimize study attrition, a strategy that has also been implemented successfully by others (Seidman et al. 2003). In addition, research staff asked participants for consent to access their contact information from service providers and other government agencies, as needed. To further improve participant retention in the follow-up period, study participants were encouraged to call study staff monthly after their baseline interview to update the name and phone numbers for contact and were provided with a \$5 honorarium for such calls. This strategy has been utilized successfully for homeless populations in previous studies (Barber et al. 2005).

Participant demographic and study outcome data were collected and managed using REDCap electronic data capture tools hosted at St. Michaels' Hospital (Harris et al. 2009). REDCap (Research Electronic Data Capture; <http://project-redcap.org/>) is a secure, web-based application designed to support data capture for research studies, providing: 1) an intuitive interface for validated data entry; 2) audit trails for tracking data manipulation and export procedures; 3)

automated export procedures for seamless data downloads to common statistical packages; and
4) procedures for importing data from external sources.

Measures and outcomes

Participant characteristics. Demographic information (e.g., age, gender, ethnicity, marital status), history of homelessness, psychiatric and chronic medical diagnoses, recent service use and social supports were assessed at study baseline.

Longitudinal outcomes. The primary study outcome was the change from baseline to 3- and 6-months' follow-up in participant health status, as measured by the Short-Form 36 (SF-36) Health Survey (Brazier et al. 2002; Ware Jr. & Sherbourne 1992). The SF-36 is a validated multi-purpose short form measure of general health status, has excellent psychometric properties, is sensitive to change over time (Ware Jr. et al. 1993) and has been used successfully in a variety of settings and diagnostic groups, including homeless people (Lehman et al. 1997; Kashner et al. 2002).

Secondary outcomes included changes in: 1) acute care service use; 2) housing outcomes; 3) mental health; 4) substance use; and 5) quality of life, described below.

Service use events (number of hospitalizations and the number of emergency department visits) in the 6 months prior to program entry and throughout program tenure were tracked using participant self-report. Data on non-acute service use, such as mental health, substance use and

primary care visits were also captured using a service use questionnaire developed by a previous large scale study of homeless adults with mental illness (Goering et al. 2011).

Additional future analyses of patterns of health care use will use administrative health care use databases at the Institute for Clinical Evaluative Sciences (ICES), where population based health information is available at the patient level for residents of Ontario. The following health care use outcomes will be examined for all consenting participants: ED visits, physician visits and inpatient hospitalizations.

Housing history was assessed using a modified version of the Residential Time Line Follow-Back Calendar (New Hampshire Dartmouth Rehabilitation Centre 1995), which has been used previously with homeless individuals (Goering et al. 2011; Tsemberis et al. 2007; New Hampshire Dartmouth Rehabilitation Centre 1995). At each study visit, participants were asked how many days they had spent in the following residence types: street, stable, temporary/unstable, emergency/crisis shelter, hospital, other institution or other. Of these residence categories, the following were considered homeless: streets, unstable residence or emergency/crisis shelters (**Additional File 1**).

The modified Colorado Symptom Index (CSI) was used to assess participant mental health symptomatology in the past month (Boothroyd & Chen 2008). Designed specifically for individuals with mental health problems, the CSI is a widely-used research instrument found to have excellent internal consistency (.92) and test-retest reliability (.71). This 14-item instrument uses a 5-point Likert scale with answer choices ranging from 0 (not at all) to 4 (at least every

day), and a summary score is tabulated (range: 0 to 56, with higher scores indicating greater symptom severity). Scores greater than 30 have been used as a clinical cut-point to identify individuals with mental health service needs (Boothroyd & Chen 2008).

Substance use was assessed by the Addiction Severity Index (ASI), a frequently used structured interview that measures both recent (previous 30 days) and lifetime severity of drug and alcohol use (McLellan et al. 1980), which has been used previously with homeless populations (Hwang et al. 2005; Joyner et al. 1996; Grinman et al. 2010). Composite scores were derived for the alcohol (ACOMP) and drug (DCOMP) use modules, ranging from 0 to 1, used to assess the severity of recent alcohol and substance use.

Participant quality of life was evaluated using the Lehman Quality of Life Interview (QoLI-20), an instrument designed for people with severe mental illness (Lehman et al. 1997). This 20-item scale uses a 7-point Likert scale to elicit participants' ratings on quality of life across seven subjective scales (living situation, everyday activities, family, social relationships, finances, safety, and satisfaction with life in general) and 4 objective scales (everyday activities, enough money, family contacts, and contacts with friends). Items can be summed for a total score (range, 20-140), with higher values corresponding to better quality of life.

Other longitudinal outcomes and covariates of interest. Several dimensions of continuity of care were tracked by case managers using program entry, monthly follow-up and program exit forms, capturing: 1) appropriateness of services accessed; 2) timeliness in services; 3) 30-day gaps in services received within the program; 4) comprehensiveness of services; and 5)

coordination of services (Dewa et al. 2010). In addition, a 12-item self-report measure, Working Alliance Inventory-Participant (WAI-PAR), modified from the original 36-item instrument measured the working-alliance construct and was used to assess client-therapist agreement on therapy goals, tasks, and the development of a strong relational bond between client and therapist (Busseri & Tyler 2003). The scale has good psychometric properties, with mean reliability estimates ranging from .79 to .97, with a modal estimate of .92 (Horvath & Greenberg 1989; Hanson et al. 2002).

Sample size calculation

Sample size calculations were based on published values from an earlier study exploring changes in SF-36 in a sample of chronically homeless adults, part of the Health Evaluation and Linkage to Primary Care (HELP) trial (Kertesz et al. 2005). Measures of the PCS and MCS means (SD) increased from 45.6 (9.6) and 30.7 (12.8) to 47.6 and 36.4, respectively, from baseline to a post-6-month follow-up visit, corresponding to an improvement of 2.0 points for the PCS and 5.7 points for the MCS (Kertesz et al. 2005). A sample size of 150 participants would yield 90% power to detect the pre-post differences in PCS and MCS when the pooled standard deviation of baseline and 6 months is as large as 7.5 and 21.4, respectively, using a two-sided paired t-test set at 5% significance level. In order to account for an attrition rate of approximately 30%, the final sample size was estimated at $150/0.70 = 214$.

Statistical analysis

Sample demographics were summarized using descriptive statistics.

Planned longitudinal analyses, including changes from baseline to 3- and 6-month follow-up will be completed using descriptive statistics and graphs stratified by clinically relevant baseline covariates. Linear mixed models (SAS PROC MIXED) with subject-specific trajectories (Singer & Willett 2003) will be initially used to test for longitudinal changes in the primary outcome variables (SF-36 MCS and PCS). Time (in months), baseline covariates, as well as the interaction between time and covariates will be included in random intercepts and slopes models. In the absence of significant variability in slopes, we will also consider repeated measures analysis (population-averaged) models under the mixed models framework using time categorically. The adjusted change in scores and 95% confidence interval from baseline to 6 months will be estimated from the final model.

Models estimating changes in secondary outcomes will vary depending on the scale of measurement, but also the time points at which they were measured. Data on acute care service use (measured by number of ED visits and hospital admissions) and housing outcomes (measured as the number of days homeless, which includes time spent on the streets or in unstable residence or emergency or crisis shelters) were collected at study baseline and both subsequent follow-up visits (3 and 6 months). For these outcomes, we will consider generalized estimating equations (SAS PROC GENMOD) with either Poisson or negative binomial distribution. We will model outcome measurements as a function of time using baseline as a reference (6 months vs. baseline, 3 months vs. baseline), and will include baseline covariates and an offset variable calculated as the log of either 180 (for baseline measures) or 90 (for follow-up measures) days. The estimated rate ratio and 95% confidence interval will compare the rates (i.e.,

expected number of visits, admissions or homeless days) at 3- and 6-months with the baseline rate.

The ASI, CSI, and Qoli20 instruments were evaluated at two time-points: baseline and 6 months. We will perform repeated measures analysis under the mixed model framework (PROC MIXED) to test and estimate the change in scores. In all models, time will be included as a categorical factor (6 months vs. baseline) and selected baseline variables will be included as predictors.

Finally, we will estimate the correlations between measures of working alliance and continuity of care with participant outcomes (Greenberg & Rosenheck 2005).

Additional analyses will be performed with a suitable comparison group of homeless adults who did not receive CATCH services, adjusting for any potential confounding (demographic and/or clinical) variables.

All data will be analyzed using SAS 9.4 (SAS Institute, Inc., Cary, NC); with statistical significance defined if two-sided P-values are 0.05 or less.

II. Qualitative data component

Participant recruitment

Individual in-depth interviews and focus groups were conducted to further explore the experiences of CATCH service users and providers, as well as the barriers and facilitators to continuity of care for this population, including accessibility, timeliness, coordination, and

comprehensiveness (Braun & Clarke 2006). Data collection took place between July 2013 and December 2014 in Toronto, Canada.

Data collection

Interviews and focus groups were led by two researchers with prior experience working with disadvantaged populations. In-depth interviews were conducted either by one or both researchers, however, both were present to lead the focus groups and ensure that no major topics were left unaddressed. The researchers met regularly with the Principal Investigator prior to and throughout data collection to refine the interview guides and prompts using an iterative process which attempted to better gauge participant perspectives (Miles et al. 2014). Consistency between interviews was ensured by interviewer training and review of early transcripts by both researchers. All interviews and focus groups were audio-recorded and transcribed verbatim by a professional transcriptionist.

In-depth interviews. In-depth interviews were conducted with a total of 29 participants. A sample of CATCH service users who completed the quantitative data components of the evaluation were selected from the full quantitative study sample by inviting every 10th participant at the 6-month exit interview to participate in an additional hour-long interview. If participants declined or were lost to follow-up, the subsequent participant was invited to participate. In total, 22 of the 33 program service users approached agreed to participate in the qualitative component of the evaluation (66%). To include a variety of perspectives on the intervention, and triangulate data sources, in-depth interviews were also conducted with managers of all partnered organizations (n=7).

Interview guides were developed with input from experts in homeless health and care coordination, and experienced qualitative research methodologists. The interview guides solicited information on the health and social service needs of service users, availability and accessibility of services, and barriers and facilitators to accessing appropriate, comprehensive and coordinated services. Service users were also asked about their experiences with the CATCH program, including direct service provision and transfers to longer-term service providers. Program managers were asked for their experiences with the intervention and its role in the broader service delivery environment.

Focus groups. In addition, three semi-structured focus groups were led by a research team member for three additional stakeholder groups: CATCH staff (n=8), people with prior lived experience of homelessness and mental illness (PWLE) (n=8) and external service providers servicing the target population (n=7). Focus groups lasted approximately 1.5 hours. Interview guides for focus groups held with external providers and PWLE focused on their perspectives of the service system's capacity to serve people experiencing homelessness.

Participants who were CATCH service users or people with lived experience of homelessness and/or mental illness received \$25 honoraria and public transportation fares for their participation.

Data analysis

Qualitative data sources will be analyzed with NVivo qualitative data analysis software (QSR International Pty Ltd. Version 9.2, 2011) using thematic analysis (Braun & Clarke 2006). A set of key concepts or ‘codes’ will be identified through initial readings of each data source. Two researchers will complete line by line coding of three transcripts and compare findings. Once consensus is achieved, one researcher will proceed to code the remaining transcripts. Excerpts from each transcript will be assigned to corresponding codes and these will be compared within and between transcripts to ensure consistency.

Upon completion of coding, the full code list and a sample of relevant quotes will be reviewed by at least three members of the research team to identify emerging themes through an iterative process of classifying, comparing, grouping, and refining key concepts into themes (Braun & Clarke 2006). Investigator triangulation during data analysis and member check-in with those that were interviewed will be used to establish trustworthiness of the data. The sample size will enable us to achieve data saturation.

Ethics, consent and permissions

The study was approved by the St. Michael’s Hospital research ethics board (#12-228). All study participants provided written informed consent.

RESULTS

In total, the CATCH program received 281 referrals from December 2012 to May 2014. Among them, 256 expressed interest in the study, 248 met eligibility criteria and 240 were enrolled as study participants (97% of eligible participants), of whom 225 (96%) successfully connected to a

case manager and completed a baseline interview. Follow-up interviews were completed with 190 (84%) and 174 (76%) participants at 3- and 6-months, respectively.

Description of program service users at baseline

Baseline characteristics of 225 program users who completed a baseline interview are found in **Table 2**. Seventy-eight percent were male, 74% Canadian-born and 68% white. The mean age was 39.9 (SD 12.0) years and approximately half of participants were aged 40 years or older (48%). Sixty-one percent of participants reported being single or never married and about a third (31%) had at least one child less than 18 years of age. Nearly all participants were unemployed (92%) and 33% had contact with the justice system in the past 6 months, including arrests, imprisonment, probation or other community sanctions. Participants had reduced social supports, with about one in six (16%) reporting no contact with either close friends or family in the past month.

The single longest period of homelessness was less than one year for more than a half of participants (60%), with 21% indicating having been homeless for 3 or more years. About half of participants (53%) first became homeless in the past three years, but a fifth (21%) had first become homeless 3 to 10 years ago, while about a quarter (26%) first became homeless 10 or more years ago.

Forty-four percent of study participants indicated at least three mental health diagnoses. The highest prevalence rates were observed for mood disorders (77%), anxiety disorders (57%), and substance misuse (50%), with 25% of participants reporting a past diagnosis of a psychotic

disorder. About half (52%) of study participants additionally indicated at least three or more chronic physical health conditions. Back problems (42%), dental problems (39%), migraines (26%) asthma (25%), high blood pressure (20%) and arthritis (20%) were the most commonly reported chronic conditions.

In the month prior to their baseline visit, less than a third (29%) of participants indicated having visited a psychiatrist and 41% indicated a primary care visit. Emergency department visits in the past six months were common with 90% indicating at least one visit in the past six months. The mean (SD) number of ED visits in the past 6 months was 4.1 ± 6.3 (median 2.0 IQR 1.0, 5.0). Nearly three quarters of participants (73%) reported being hospitalized at least once in the past 6 months, for mean of 1.2 ± 1.2 (SD) times (median 1.0 IQR 0.0, 2.0).

DISCUSSION

This article described the impetus for a multidisciplinary brief intervention for homeless adults discharged from hospital in a large urban centre, as well as the intervention's detailed evaluation plan, using a case study design and mixed methods. Previous research has demonstrated that time-limited case management, particularly CTI, can be successful in reducing recurrent homelessness among individuals experiencing mental illness discharged from inpatient psychiatric units (Susser et al. 1997; Herman et al. 2011), and in decreasing rates of subsequent psychiatric hospitalizations (Tomita & Herman 2012). The implementation and evaluation of a range of interventions in diverse service delivery contexts can add to the growing knowledge base and further highlight key program ingredients of successful care transitions and improved

health outcomes for this population. While previous research has focused on individual case management, and reductions in homelessness (Susser et al. 1997; Herman et al. 2011) and service use (Tomita & Herman 2012), the current initiative introduced a multidisciplinary intervention, bridging multiple organizations and sectors and set to investigate additional outcomes of relevance, including health status and quality of life, as well as the role of the working alliance and continuity of care in improving health and service use outcomes.

The baseline characteristics of our study participants' parallel those of the homeless population in Toronto, in terms of age, gender, ethnicity, education and Canadian birth (Khandor & Mason 2007). However, unlike previous surveys of Toronto's homeless population, more than half of CATCH study participants indicated that their single longest period of homelessness was less than 1 year and more than half indicated that they had first become homeless in the 3 years before study start. In comparison, a survey of homeless individual in Toronto in 2006-2007 found that only one in five had been homeless for less than year, and a third had been homeless for 5 years or longer (Khandor & Mason 2007). Furthermore, a 2013 survey found that the average length of time homeless in Toronto was 3 years, with more than two thirds (68%) of those surveyed indicating being homeless for 2 or more years (City of Toronto Shelter Support and Housing Administration 2013). It is possible that CATCH study participants, recruited at the point of discharge from hospital (often from a psychiatric unit), represent a subset of the homeless population that has been homeless for a shorter period, compared to homeless people who are not hospitalized, and that disease burden may facilitate more timely connection to services and supports for homeless individuals. This inference is supported by similar lengths of homelessness observed in a previous sample of homeless participants recruited at point of

hospital discharge from a psychiatric ward in a randomized trial of CTI in the U.S.A; only 40% indicated being homeless for more than 1 year and a third were homeless no more than 3 months (31%) (Herman et al. 2011).

The presence of multimorbidity in our sample supports a multidisciplinary intervention design, as self-reported past month access to medical and psychiatric care was low. Barriers to healthcare access are multiple for this population, even within the context of universal health insurance (Lewis 2015; Asada & Kephart 2007). A 2006-2007 cross-sectional study of 385 homeless adults from Toronto shelter and meal programs found that while economic reasons (including cost of rent, low income, unemployment) were cited as the top reason preventing respondents from finding and maintaining housing (by 78%), the second most common reason cited was mental and physical health conditions, indicated by a third of the sample (33%) (Khandor & Mason 2007). Interventions integrating health, mental health and social care are therefore needed to ensure that homeless people have access to appropriate services and supports.

The evaluation design is not without limitations. Firstly, the lack of a randomized control group will limit our ability to make causal inferences between the intervention and outcomes over time. Both logistic and population constraints did not allow us to implement a randomized design at this time. However, we plan a comparison of several study outcomes with a sample of homeless adults who received usual services in Toronto over the same time period. In addition, a parallel randomized controlled trial of a brief case management intervention for frequent users of EDs with mental health and addictions challenges by our group will offer experimental evidence to

guide programs and services targeting improved transitions and continuity of care for disadvantaged populations. Secondly, a longer follow-up period would have allowed us to examine whether any improvements observed are sustained in the long term. Nonetheless, acute care utilization will be examined for the two years prior and the year following the intervention using administrative data holdings. Future studies could examine additional outcomes of relevance, including the cost-effectiveness of brief interventions and service user preferences regarding care transitions.

CONCLUSION

Improving health and service use outcomes among people experiencing homelessness are key priorities in many jurisdictions. This article described a multidisciplinary brief intervention for homeless adults discharged from hospital in a large urban centre in Canada and the intervention's evaluation design. Aiming to identify factors associated with improved health and health service use outcomes during care transitions and expose barriers and facilitators to continuity of care for this disadvantaged population, this study can address important knowledge gaps and inform policy and practice in many jurisdictions facing similar challenges.

LIST OF ABBREVIATIONS

ASI, Addiction Severity Index; CSI, Colorado Symptom Index; CATCH, Coordinated Access to Care for Homeless People; C-SSS10, Core Service Satisfaction Scale; CTI, Critical Time Intervention; ED, Emergency department; IQR, interquartile range; SF-36, Short-Form 36; QoLI-20, Lehman Quality of Life Interview; WAI-PAR, Working Alliance Inventory-Participant

INFORMED CONSENT

All procedures followed will be in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2000 (5). Informed consent was obtained from all participants for being included in the study.

FIGURE CAPTION

Figure 1: Proposed participant flow diagram.

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SUPPLEMENTAL FILES

Supplemental Table 1: Description of residence types.

(Document file: Supplemental File_2016_02_02.docx)

TABLES

Table 1: Sources of quantitative and qualitative data.

Participant groups	Types of data collected	Number of participants
Program clients	Quantitative surveys ¹	225
	In depth interviews	22
Managers of partnered organizations	In depth interviews	7
People with lived experienced of homelessness and mental health or addictions	Focus group	8
CATCH staff and case managers	Focus group	8
Other mental health and addictions frontline service providers	Focus group	7

¹ The following data were collected at all three time points (baseline, 3- and 6-months visits): physical and mental health (primary outcome), acute health care utilization and housing history. Data on mental health symptoms, substance use and disease specific quality of life were captured at baseline and 6-month visits. Working alliance was assessed only at follow-up visits. Continuity of care was measured via monthly forms completed by CATCH case managers.

Table 2: Baseline characteristics of CATCH program users who participated in study (n=225).

Characteristic	N (%)	N Missing
Sociodemographic		
Age (years), mean $\pm$ SD ¹	39.9 $\pm$ 12.0	0
Male	175 (77.8)	0
Canadian born	166 (73.8)	0
English main language	189 (84.0)	0
Ethnicity or cultural identity		
Aboriginal	11 (4.9)	
Ethno-racial	50 (22.2)	
White	154 (68.4)	
Other	10 (4.4)	
Single, never married	137 (60.9)	0
Has at least one child under 18 years of age	70 (31.1)	0
Education		2
Less than high school	110 (49.3)	
Completed high school	41 (18.4)	
Completed college/university/grad school	72 (32.3)	
Unemployed	208 (92.4)	0
Total income past month (\$CAD)		8
< \$500/month	77 (35.5)	
$\geq$ \$500 to \$1000/month	89 (41.0)	
$\geq$ \$1001 or more/month	51 (23.5)	

Receives disability income	87 (38.7)	
Homelessness and Housing History		
Single longest period of homelessness		5
<1 month to < 1 year	133 (60.5)	
≥ 1 year to <3 years	41 (18.6)	
≥ 3 years	46 (20.9)	
Spent at least one night in the following places in the past 6 months		3
Street	67 (30.2)	
Temporary Residence	137 (61.7)	
Hospital	139 (62.3)	
Emergency/Crisis (includes shelters and EDs)	129 (58.1)	
Stable residence	100 (44.8)	
Other institution	76 (34.1)	
Physical and Mental Health		
Diagnoses		
Mood disorder ²	170 (76.6)	3
Anxiety disorder ³	125 (57.1)	6
Psychotic disorder ⁴	55 (25.0)	5
Personality disorder	38 (18.0)	14
Eating disorder	17 (7.8)	8
Alcohol or substance misuse	112 (50.5)	3
Proportion of participants with ≥3 above diagnoses	98 (43.8)	1
Participants with ≥ 3 comorbid medical conditions	117 (52.2)	1

Service Use		
Has seen primary care physician at least once in past month	91 (40.6)	1
Has seen psychiatrist at least once in past month	65 (29.2)	2
Has seen a nurse at least once in the past month	41 (18.3)	1
Had an ED Visit in past 6 months	201 (90.1)	2
Number of ED visits in past 6 months, mean $\pm$ SD ⁵	4.1 $\pm$ 6.3	2
Had a hospital admissions in past 6 months	162 (72.7)	2
Number of hospital admissions in past 6 months, mean $\pm$ SD ⁶	1.2 $\pm$ 1.2	2
Had contact with justice system in past 6 months ⁷	74 (33.2)	2
Social Supports		8
No contact with either close friends or family in past month	34 (15.7)	
Contact with friends only in past month	39 (18.0)	
Contact with family only in past month	49 (22.6)	
Contact with both friends and family in past month	95 (43.8)	

¹ Median (IQR) age: 39.6 (30.2, 49.3)

² Mood disorder included diagnoses of depression or bipolar disorder

³ Anxiety disorder includes diagnoses of anxiety disorders (e.g. obsessive compulsive disorder, post-traumatic stress disorder, generalized anxiety disorder) as well as phobias

⁴ Psychotic disorder includes diagnoses of schizophrenia, schizoaffective disorder and individuals who indicated psychosis.

⁵ Median (IQR) number of ED visits: 2.0 (1.0, 5.0)

⁶ Median (IQR) number of hospitalizations: 1.0 (0.0, 2.0)

⁷ Contact with justice system included arrest, imprisonment or probation.

REFERENCES

- Asada, Y., & Kephart, G. (2007). Equity in health services use and intensity of use in Canada. *BMC Health Services Research*, 7, 41. doi:10.1186/1472-6963-7-41
- Baker, G. R. (2011). *Enhancing the Continuum of Care: Report of the Avoidable Hospitalization Advisory Panel*. Toronto, Ontario: Ministry of Health and Long-Term care Retrieved from http://www.health.gov.on.ca/en/common/ministry/publications/reports/baker_2011/baker_2011.pdf.
- Barber, C. C., Fonagy, P., Fultz, J., Simulinas, M., & Yates, M. (2005). Homeless near a thousand homes: outcomes of homeless youth in a crisis shelter. *American Journal of Orthopsychiatry*, 75(3), 347-355. doi:10.1037/0002-9432.75.3.347
- Bharel, M., Lin, W.-C., Zhang, J., O'Connell, E., Taube, R., & Clark, R. E. (2013). Health Care Utilization Patterns of Homeless Individuals in Boston: Preparing for Medicaid Expansion Under the Affordable Care Act. *American Journal of Public Health*, 103(S2), S311-S317. doi:10.2105/AJPH.2013.301421
- Boothroyd, R., & Chen, H. (2008). The Psychometric Properties of the Colorado Symptom Index. *Administration and Policy in Mental Health*, 35(5), 370-378.
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77-101. doi:10.1191/1478088706qp063oa
- Brazier, J., Roberts, J., & Deverill, M. (2002). The estimation of a preference-based measure of health from the SF-36. *Journal of Health Economics*, 21(2), 271-292. doi:[http://dx.doi.org/10.1016/S0167-6296\(01\)00130-8](http://dx.doi.org/10.1016/S0167-6296(01)00130-8)

Busseri, M. A., & Tyler, J. D. (2003). Interchangeability of the Working Alliance Inventory and Working Alliance Inventory, Short Form. *Psychol.Assess.*, 15(2), 193-197.

City of Toronto Shelter Support and Housing Administration. (2013). *2013 Street Needs Assessment Results*. Retrieved from Toronto, Canada:

Dewa, C. S., Jacobson, N., Durbin, J., Lin, E., Zipursky, R. B., & Goering, P. (2010). Examining the Effects of Enhanced Funding for Specialized Community Mental Health Programs on Continuity of Care. *Canadian Journal of Community Mental Health*, 29(S5), 23-40. doi:10.7870/cjcmh-2010-0032

Fazel, S., Geddes, J. R., & Kushel, M. (2014). The health of homeless people in high-income countries: descriptive epidemiology, health consequences, and clinical and policy recommendations. *The Lancet*, 384(9953), 1529-1540.

Fontanella, C. A., Guada, J., Phillips, G., Ranbom, L., & Fortney, J. C. (2014). Individual and contextual-level factors associated with continuity of care for adults with schizophrenia. *Administration and Policy in Mental Health*, 41(5), 572-587. doi:10.1007/s10488-013-0500-x

Fortney, J., Sullivan, G., Williams, K., Jackson, C., Morton, S. C., & Koegel, P. (2003). Measuring continuity of care for clients of public mental health systems. *Health Services Research*, 38(4), 1157-1175.

Gaetz, S., DeJ, E., Richter, T., & Redman, M. (2016). *The State of Homelessness in Canada 2016*. Retrieved from Toronto:

Goering, P., Streiner, D., Adair, C. E., Aubry, T., Barker, J., Distasio, J., . . . Zabkiewicz, D. (2011). The At Home/Chez Soi trial protocol: a pragmatic, multi-site, randomized controlled trial of Housing First in five Canadian cities. *BMJ Open*, 1(2), e000323.

Greenberg, G. A., & Rosenheck, R. A. (2005). Continuity of care and clinical outcomes in a national health system. *Psychiatric Services*, 56(4), 427-433.

doi:10.1176/appi.ps.56.4.427

Grinman, M. N., Chiu, S., Redelmeier, D. A., Levinson, W., Kiss, A., Tolomiczenko, G., . . .

Hwang, S. W. (2010). Drug problems among homeless individuals in Toronto, Canada: prevalence, drugs of choice, and relation to health status. *BMC Public Health*, 10, 94.

doi:1471-2458-10-94 [pii]

10.1186/1471-2458-10-94

Haggerty, J. L., Reid, R. J., Freeman, G. K., Starfield, B. H., Adair, C. E., & McKendry, R.

(2003). Continuity of care: a multidisciplinary review. *BMJ*, 327(7425), 1219-1221.

doi:10.1136/bmj.327.7425.1219

Hanson, W. E., Curry, K. T., & Bandalos, D. L. (2002). Reliability Generalization of Working Alliance Inventory Scale Scores. *Educational and Psychological Measurement*, 62(4),

659-673. doi:10.1177/0013164402062004008

Harris, P. A., Taylor, R., Thielke, R., Payne, J., Gonzalez, N., & Conde, J. G. (2009). Research electronic data capture (REDCap)--a metadata-driven methodology and workflow

process for providing translational research informatics support. *J Biomed Inform*, 42(2),

377-381. doi:10.1016/j.jbi.2008.08.010

Herman, D. B., Conover, S., Felix, A., Nakagawa, A., & Mills, D. (2007). Critical Time

Intervention: an empirically supported model for preventing homelessness in high risk

groups. *Journal of Primary Prevention*, 28(3-4), 295-312. doi:10.1007/s10935-007-0099-

3

- Herman, D. B., Conover, S., Gorroochurn, P., Hinterland, K., Hoepner, L., & Susser, E. S. (2011). Randomized trial of critical time intervention to prevent homelessness after hospital discharge. *Psychiatric Services*, 62(7), 713-719. doi:62/7/713 [pii] 10.1176/appi.ps.62.7.713
- Herman, D. B., Opler, L., Felix, A., Valencia, E., Wyatt, R. J., & Susser, E. (2000). A critical time intervention with mentally ill homeless men: impact on psychiatric symptoms. *Journal of Nervous and Mental Disease*, 188(3), 135-140.
- Horvath, A. O., & Greenberg, L. S. (1989). Development and Validation of the Working Alliance Inventory. *Journal of Counseling Psychology*, 36(2), 223-233.
- Hwang, S. W. (2001). Homelessness and health. *CMAJ: Canadian Medical Association Journal*, 164(2), 229-233.
- Hwang, S. W., Tolomiczenko, G., Kouyoumdjian, F. G., & Garner, R. E. (2005). Interventions to improve the health of the homeless: a systematic review. *American Journal of Preventive Medicine*, 29(4), 311-319. doi:10.1016/j.amepre.2005.06.017
- Hwang, S. W., Weaver, J., Aubry, T., & Hoch, J. S. (2011). Hospital costs and length of stay among homeless patients admitted to medical, surgical, and psychiatric services. *Medical Care*, 49(4), 350-354. doi:10.1097/MLR.0b013e318206c50d
- Jones, K., Colson, P. W., Holter, M. C., Lin, S., Valencia, E., Susser, E., & Wyatt, R. J. (2003). Cost-effectiveness of critical time intervention to reduce homelessness among persons with mental illness. *Psychiatric Services*, 54(6), 884-890.
- Joyner, L. M., Wright, J. D., & Devine, J. A. (1996). Reliability and validity of the addiction severity index among homeless substance misusers. *Substance Use and Misuse*, 31(6), 729-751.

- Kashner, T., Rosenheck, R., Campinell, A., & et al. (2002). Impact of work therapy on health status among homeless, substance-dependent veterans: A randomized controlled trial. *Archives of General Psychiatry*, 59(10), 938-944. doi:10.1001/archpsyc.59.10.938
- Kasprow, W. J., & Rosenheck, R. A. (2007). Outcomes of critical time intervention case management of homeless veterans after psychiatric hospitalization. *Psychiatric Services*, 58(7), 929-935. doi:10.1176/appi.ps.58.7.929
- Kertesz, S. G., Larson, M. J., Horton, N. J., Winter, M., Saitz, R., & Samet, J. H. (2005). Homeless chronicity and health-related quality of life trajectories among adults with addictions. *Medical Care*, 43(6), 574-585. doi:00005650-200506000-00008 [pii]
- Khandor, E., & Mason, K. (2007). *The Street Health Report 2007*. Retrieved from <http://www.homelesshub.ca/Resource/Frame.aspx?url=http%3a%2f%2fwww.homelesshub.ca%2fResourceFiles%2fSHReport2007.pdf&id=34083&title=The+Street+Health+Report+2007&owner=121>
- Lehman, A. F., Dixon, L. B., Kernan, E., DeForge, B. R., & Postrado, L. T. (1997). A randomized trial of assertive community treatment for homeless persons with severe mental illness. *Archives of General Psychiatry*, 54(11), 1038-1043.
- Lennon, M. C., McAllister, W., Kuang, L., & Herman, D. B. (2005). Capturing intervention effects over time: reanalysis of a critical time intervention for homeless mentally ill men. *American Journal of Public Health*, 95(10), 1760-1766. doi:10.2105/AJPH.2005.064402
- Lewis, S. (2015). A System in Name Only — Access, Variation, and Reform in Canada's Provinces. *New England Journal of Medicine*, 372(6), 497-500. doi:doi:10.1056/NEJMp1414409

- McLellan, A. T., Luborsky, L., Woody, G. E., & O'Brien, C. P. (1980). An improved diagnostic evaluation instrument for substance abuse patients. The Addiction Severity Index. *Journal of Nervous and Mental Disease*, 168(1), 26-33.
- Miles, M. B., Huberman, A. M., Saldana, J., & Arizona State University. (2014). *Qualitative Data Analysis A Methods Sourcebook* (3rd ed.). Thousand Oaks, CA: SAGE Publications Inc.
- Ministry of Health and Long-Term Care. (2012a). About Health Links. Retrieved from http://news.ontario.ca/mohltc/en/2012/12/about-health-links.html?_ga=1.54438312.1008291784.1434735456
- Ministry of Health and Long-Term Care. (2012b). Improving Care for High-Needs Patients: McGuinty Government Linking Health Providers, Offering Patients More Co-ordinated Care. Retrieved from <http://news.ontario.ca/mohltc/en/2012/12/improving-care-for-high-needs-patients.html>
- New Hampshire Dartmouth Rehabilitation Centre. (1995). *Residential Follow-Back Calendar*. Retrieved from Lebanon, NH:
- Rothbauer, P. (2008). Triangulation. In L. M. Given (Ed.), *The SAGE encyclopedia of qualitative research methods*. Thousand Oaks, CA: SAGE Publications Ltd.
- Salize, H. J., Werner, A., & Jacke, C. O. (2013). Service provision for mentally disordered homeless people. *Curr Opin Psychiatry*, 26(4), 355-361.
doi:10.1097/YCO.0b013e328361e596
- Seidman, L. J., Schutt, R. K., Caplan, B., Tolomiczenko, G. S., Turner, W. M., & Goldfinger, S. M. (2003). The effect of housing interventions on neuropsychological functioning among homeless persons with mental illness. *Psychiatric Services*, 54(6), 905-908.

- Singer, J. D., & Willett, J. B. (2003). *Applied longitudinal data analysis: modeling change and event occurrence*. New York Oxford University Press.
- Stake, R. (2005). Qualitative case studies In N. K. Denzin & Y. S. Lincoln (Eds.), *The Sage handbook of qualitative research, 3rd edition* (pp. 433-466). Thousand Oaks, CA: Sage.
- Stergiopoulos, V., Cusi, A., Bekele, T., Skosireva, A., Latimer, E., Schutz, C., . . . Rourke, S. B. (2015). Neurocognitive impairment in a large sample of homeless adults with mental illness. *Acta Psychiatrica Scandinavica*, 131(4), 256-268. doi:10.1111/acps.12391
- Susser, E., Valencia, E., Conover, S., Felix, A., Tsai, W. Y., & Wyatt, R. J. (1997). Preventing recurrent homelessness among mentally ill men: a "critical time" intervention after discharge from a shelter. *American Journal of Public Health*, 87(2), 256-262.
- Tomita, A., & Herman, D. B. (2012). The impact of critical time intervention in reducing psychiatric rehospitalization after hospital discharge. *Psychiatric Services*, 63(9), 935-937. doi:10.1176/appi.ps.201100468
- Tomita, A., & Herman, D. B. (2015). The role of a critical time intervention on the experience of continuity of care among persons with severe mental illness after hospital discharge. *Journal of Nervous and Mental Disease*, 203(1), 65-70. doi:10.1097/NMD.0000000000000224
- Tsemberis, S., McHugo, G., Williams, V., Hanrahan, P., & Stefancic, A. (2007). Measuring homelessness and residential stability: The residential time-line follow-back inventory. *Journal of Community Psychology*, 35(1), 29-42.
- Ware Jr., J. E., & Sherbourne, C. D. (1992). The MOS 36-item short-form health survey (SF-36). I. Conceptual framework and item selection. *Medical Care*, 30(6), 473-483.

Ware Jr., J. E., Snow, K., Kosinski, M., & Gandek, B. (1993). *SF-36 Health Survey Manual and Interpretation Guide* Boston, MA: New England Medical Centre, The Health Institute.