Critical Time Intervention: Results from a Randomized Trial to Prevent Homelessness in Persons with Severe Mental Illness following Institutional Discharge

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Introduction

Despite considerable attention from advocates, clinicians, policymakers and researchers, homelessness continues as a distressingly common experience among persons with severe mental illness (SMI). Homelessness has a dramatic and adverse impact on morbidity and mortality (Hibbs, Benner et al. 1994; Barrow, Herman et al. 1999; Hwang 2000; Hwang 2002; Herman and Manuel 2008).

For mentally ill individuals, homelessness impedes their access to ability to benefit from needed treatment and supports, and contributes to deterioration in social functioning and attenuation of social bonds. Furthermore, research suggests that homelessness is often experienced as a traumatic event that may have lasting psychological impact (Link, Susser et al. 1994; Link, Phelan et al. 1995).

The past fifteen years have seen the development of a range of strategies focused on this problem. These include outreach and engagement approaches (Barrow, Hellman et al. 1991), adaptations of assertive community treatment (Lehman, Dixon et al. 1997), and a broad array of transitional and permanent housing models with varying levels of associated treatment and support (Tsemberis and Eisenberg 2000; Hopper and Barrow 2003). While a growing body of research has begun to assess the effectiveness of these approaches in meeting the complex needs of homeless persons with mental illness, there remain very few carefully documented models intended to reduce the incidence of homelessness among persons with SMI. In this article, we report the results of a randomized trial testing one such model, Critical Time Intervention (CTI), which aims in this instance to prevent homelessness among persons with SMI following discharge from inpatient psychiatric care.

Rationale

The period following hospital discharge is one in which persons with SMI are at high risk for either first-episode or recurrent homelessness (Herman, Susser et al. 1998; Olfson, Mechanic et al. 1999). During this period patients are also at risk for other adverse outcomes including suicide
(Goldacre, Seagroatt et al. 1993; Hoyer, Mortensen et al. 2000; Troister, Links et al. 2008), psychiatric re-hospitalization (Cuffel, Held et al. 2002; Ilgen, Hu et al. 2008) and violence against others (Steadman, Mulvey et al. 1998). Reasons for the elevated risk of undesirable events during this period may include both the impact of enduring psychiatric symptoms that led to the inpatient episode plus difficulties in establishing effective connections to sources of treatment, housing and support in the community. There is consequently a pressing need to test strategies that may reduce homelessness and other adverse outcomes during this transitional period. Effective interventions delivered during this critical time, in addition to preventing traumatic, costly and potentially life-threatening events, may also facilitate the difficult ongoing tasks associated with adjustment and community integration for persons with SMI.

CTI developed out of our experience at shelters in New York City during the early 1990s that housed large numbers of chronically homeless men, many of whom had SMI (Valencia, Susser et al. 1997). Over the course of several years, on-site mental health teams at these shelters developed comprehensive treatment programs delivering outreach and case finding, psychiatric medication, rehabilitation groups, entitlement counseling, and case management. Due to an unprecedented expansion of publicly-supported housing options during this period, the shelter mental health team was able refer many of their clients into housing following, in most cases, a significant period of shelter-based treatment. Clinical observation and research at two shelters revealed that a large proportion of men placed into housing became homeless soon after discharge from the shelter. Despite having well-conceived discharge plans and access to housing, the men still did not have the type of assistance they needed to overcome the natural discontinuity in support they experienced during their transition.

One reason that such transitional periods are especially challenging is that clients are typically called upon to navigate a complex and fragmented system of care (Dorwart and Hoover 1994; Olfson,
Mechanic et al. 1998). Furthermore, the transition period is typically accompanied by the loss of personal relationships with key individuals on whom the client has relied during his institutional stay. This may include other residents, members of the treatment team, and institutional staff. These relationships may have provided important sources of support that end abruptly following a typical move from institution to permanent or transitional housing. The transition period can also be a difficult time in the relationship between the client and his or her family and social network. Family members and friends frequently have not received adequate psychoeducational information regarding the client's illness or guidance in problem-solving approaches (Lehman and Steinwachs 1998). Clients' needs and behaviors may therefore be poorly understood by family members and friends, leading to disruption in these critically important connections.

Thus, in our group's view, there was a clear need to augment the service delivery model to enhance continuity of care during the “critical time” of transition from shelter to community. Furthermore, there was a hope that a time-limited intervention provided during this key period, if effective, might have durable beneficial effects by helping to strengthen a network of community support that would endure beyond the period of the intervention itself. CTI shares with long-term assertive community treatment models a focus on stabilizing clients in the community through in vivo development of independent living skills and by building effective support networks in the community (Lehman, Dixon et al. 1997). The emphasis, however, is on maintaining continuity of care during the critical period of transition, while primary responsibility is gradually passed to the existing supports in the community.

**Previous Research**

Previous studies provide evidence of CTI’s effectiveness in several different settings. The first test of the model was our randomized trial that assessed the effectiveness of CTI in preventing
homelessness among 96 homeless men with SMI being placed into community housing from a large municipal shelter institution in New York City. In this study, CTI was associated with a significant, lasting reduction in post-discharge homelessness over an 18-month follow-up period (Susser, Valencia et al. 1997). Of particular note is that the observed effect persisted past the end of the nine-month period of active intervention, consistent with the hypothesis that the intervention successfully enhanced community supports. A subsequent reanalysis employing latent class growth analysis provided further evidence of the impact of CTI on reducing the risk of homelessness during the follow-up period (Lennon, McAllister et al. 2005).

In further analyses, symptom severity at discharge from the shelter and six months afterwards were assessed with the Positive and Negative Syndrome Scale (Kay, Opler et al. 2006). Using data on 76 subjects for whom we had complete symptom data, we assessed the impact of CTI on change in symptoms. The results suggest that CTI was associated with a statistically significant decrease in negative symptoms at the 6-month follow-up, reflecting modest clinical improvement. There was no significant effect on positive or general psychopathology symptoms. Although the finding on negative symptoms requires replication, we have hypothesized that by encouraging clients to focus on planning and organizing their transition from institution to community living, CTI may contribute to cognitive remediation by helping to reactivate prefrontal cortical functions involved in these cognitive activities (Herman, Opler et al. 2000). Finally, an economic analysis found that the CTI group and the usual services group incurred mean costs of $52,374 and $51,649, respectively, for acute care services, outpatient services, housing and shelter services, criminal justice services, and transfer income over the follow-up period. Since these essentially similar costs were associated with a significantly reduced homelessness in the CTI group, we concluded that the intervention was cost-effective in comparison with usual care (Jones, Colson et al. 2003).
More recently, other investigators have adapted and studied CTI in other settings. A six-month version of the model was implemented at eight Department of Veterans’ Affairs (VA) medical centers throughout the US. In a quasi-experimental study, a cohort of 278 homeless persons with SMI were recruited and followed for one-year after discharge from inpatient psychiatric treatment, receiving standard case management services in the community. Following this, case managers at the service delivery sites received training and implementation support in the six-month CTI model and a second cohort of 206 subjects were recruited and offered CTI. Controlling for baseline differences between cohorts, study investigators found that the CTI cohort had on average 19% more days housed than did the first cohort in each 90-day reporting period over the one-year follow-up period (p<.002) (Kasprow and Rosenheck 2007).

Finally, other VA investigators studied a three-month adaptation of CTI (B-CTI) designed to improve continuity of care among non-homeless patients following discharge from acute psychiatric treatment. The brevity of the intervention was justified by the more modest goals involved in the study as well as its focus on a population with less complex psychosocial needs. In this experimental study, 155 veterans with SMI were randomly assigned to either B-CTI or usual care following hospital discharge. Those assigned to B-CTI had significantly fewer days than the usual services group between their date of discharge and their first aftercare visit and more total mental health and substance abuse treatment visits during the six month follow-up period. The B-CTI group also had greater continuity of care (i.e., fewer periods without outpatient contact) than the controls, although there were no significant group differences in psychiatric symptoms or satisfaction with care (Dixon, Goldberg et al. 2009).
Methods

Study Design

We conducted a prospective, single-blind, randomized trial to assess the impact of CTI in reducing the risk of recurrent homelessness among men and women with SMI following discharge from inpatient psychiatric treatment. We compared homelessness outcomes in a group of subjects assigned to receive a nine-month version of CTI plus usual care with a group of subjects receiving usual care only. The trial was approved by the hospital’s institutional review board under a multi-site collaborative agreement overseen by the New York State Office of Mental Health.

Participant selection and randomization

The original design called for subjects to be recruited during their inpatient stay at a large state-operated psychiatric hospital located in the metropolitan New York City area. However, before recruitment began, policy changes at the hospital led to most homeless patients being discharged to transitional residences (TR) located on the grounds of this hospital and a sister institution located elsewhere in the metropolitan area. Before the study began, we therefore revised our methods to recruit subjects at these two TR rather than on the inpatient wards. These residences, also operated by the state mental health authority, were designed to provide temporary housing and treatment for patients who were either deemed unready for community placement or who were ready for such placement but for whom no housing option had been identified. Typically, patients referred from inpatient treatment to the TR were considered to be at high risk of adverse outcomes following discharge. While in the TR, patients were expected to receive treatment delivered by teams connected with the TR but housed in different locations. Assistance in identifying housing and services in the community was provided by social services staff located in the TR.
Persons were considered eligible if they met the following criteria: 1) currently living in one of the two designated TR following hospitalization in either of the two designated hospitals during the four-year recruitment period (2002-2006) and discharged from the TR before the end of this period; 2) DSM-IV diagnosis of a psychotic disorder; 3) homeless at the index hospitalization or within eighteen months preceding this admission; and 4) planned discharge to a non-institutional location in New York City. We excluded those who were unable to provide informed consent for the screening interview or did not speak English. We also excluded those who did not stay more than three weeknights in the TR or whose employment schedule made them unavailable to project staff during regular work hours.

Research staff approached each newly admitted individual and, after obtaining consent for this initial interview, conducted a brief interview to screen for prior homelessness (defined as staying overnight in a shelter, on the streets, in a park, on a subway train, or in any other public space) during the period immediately preceding the current hospitalization. Those who met the homelessness criterion were then provided with the full study description and their informed consent for participation in the trial was obtained.

The baseline interview (details below) was then conducted. This interview, which included the Structured Clinical Interview for DSM-IV (SCID), yielded a DSM-IV diagnosis which was used to verify that the subject met our diagnostic eligibility criteria. Those not meeting these criteria were excluded at this point.

All eligible subjects were randomized at this point, although a small number were subsequently dropped if they did not move from the TR to a community location in NYC before the end of the study recruitment period. Subjects were randomized independently by gender and by diagnosis of lifetime substance abuse disorder. To reduce variation on key factors, we randomized individuals in these stratification groups in permuted blocks of randomly varying size. The study’s statistical
consultant produced a random number list for each of the strata and furnished this list to the study administrator. Following assessment of eligibility and enrollment into the study, field staff contacted the study administrator and obtained the group assignment (CTI or usual services) for the current subject. Subjects assigned to receive CTI were then informed by clinical staff of his or her assignment. Figure 1 summarizes sample screening, accrual and retention.

Assessments

As noted above, subjects were first administered the Structured Clinical Interview for DSM-IV (SCID), an instrument of demonstrated reliability that we have used previously with this population. Interviewers were master’s level health professionals with clinical experience who were trained by the authors of the instrument using a standard protocol. The Personal History Form, employed extensively in our earlier research with this population (Susser, Valencia et al. 1997), was used at baseline to measure demographic characteristics and personal history, including prior use of institutional and non-institutional treatment services and residential history, including previous homeless episodes.

Following discharge from the TR, subjects were interviewed face-to-face every six weeks for eighteen months in order to document where they had spent each night during the respective follow-up period. These assessments were carried out by trained interviewers blind to the subject’s group assignment. In cases in which a subject had missed an interview, the interviewer documented where the subject had spent each night since the last completed assessment. This allowed us to capture each subject’s continuous residential experience over the entire follow-up period of the study. In some instances when subjects could not be directly interviewed, we carried out the housing assessment with a family member, caseworker, or another of the subject’s close associates who we had been granted permission to contact. We have reported previously on a test-retest study which demonstrated that
homelessness could be assessed with high reliability (kappa=.93) using this approach (Susser, Valencia et al. 1997).

**Interventions**

While living in TR, all subjects received basic discharge planning services and access to psychiatric treatment. After discharge from the TR, subjects in both conditions received a range of “usual” community-based supportive and treatment services depending on the individual’s needs, preferences and living situation. These services may have included various types of case management and clinical treatment. A few subjects (8.2 percent) were assigned to mandatory outpatient treatment and/or assertive community treatment programs. In addition to the services noted above, subjects randomly assigned to the experimental condition received CTI (described below) for a nine-month period following discharge from the TR. Those assigned to the control condition received usual services only. Post-discharge housing arrangements were typically coordinated by discharge planning staff located at the TR. These arrangements ranged from halfway houses and other structured residential programs to supportive apartments and independent housing, either alone or with family members. Some individuals left the TR “against medical advice” and returned to shelters or street living. Neither CTI workers nor research staff played a role in determining the initial post-discharge living arrangement for individuals in either condition. Some individuals left the TR “against medical advice” and returned to shelters or the streets.

**Critical Time Intervention**

CTI aims to prevent recurrent homelessness and other adverse outcomes following discharge in two main ways: by strengthening the individual’s long-term ties to services, family, and friends; and by providing emotional and practical support during the critical time of transition. An important aspect of CTI is that post-discharge services are delivered by workers who have established relationships with
clients before discharge. The nine-month intervention itself is delivered in three phases, each of which lasts approximately three months (see Table 1). Further detail on the model is available in other publications (Herman, Conover et al. 2007).

The first phase—transition to the community—focuses on providing intensive support and assessing the resources that exist for the transition of care to community providers. Ideally, the CTI worker has already begun to engage the client in a working relationship before he or she moves into the community. This is important because the worker will build on this relationship to effectively support the client following discharge from the institution. During the first few weeks following this move, the CTI worker maintains a high level of contact with the client, both through regular telephone calls and home visits. Clients are accompanied to appointments with selected community providers, such as mental health and medical clinics. The CTI worker “introduces” the client to his or her new providers in order to facilitate the development of a durable tie and encourages them to negotiate compromises when problems arise. The CTI worker also meets with key figures in the client’s residence. These figures are most often the primary caretaker in a family home or staff in a supervised residence, but in some cases may include a single-room occupancy hotel manager or an involved neighbor. The CTI worker offers support to these persons while making it clear that he or she is prepared, when necessary, to mediate a compromise between them and the client. They discuss potential housing crises and try to identify ways to avoid them or possible coping strategies and resources, should a crisis occur. This work sometimes includes informal family psychoeducation in which the CTI worker may educate a family member about the client’s mental illness. During these initial intensive contacts, the worker is also gathering data needed for treatment planning in the transition period. He or she works together with clients and service providers to detail proposed arrangements to ensure medication adherence, money management, or control of substance abuse. The CTI worker generally makes detailed arrangements in
only the handful of areas that are seen as most critical for the community survival of that individual (i.e., medication adherence); it is important not to be overly ambitious. There is also a strong emphasis on assessing the feasibility of the support systems that are established because they are intended to persist well after the CTI worker has terminated services.

The second phase of CTI—*try out*—is devoted to testing and adjusting the systems of support that were developed in phase one. By now, community providers will have assumed primary responsibility for the provision of support and services, and the CTI worker can focus on assessing the degree to which this support system is functioning as planned. During this phase, the worker encourages the client and members of his or her support system to handle problems on their own. The worker meets with the client less frequently, but maintains regular contact in order to observe how the plan is working and be ready to intervene when a crisis arises. In many cases, further modification of the support system is required. Such “system adjustment” may be accomplished via a case conference or less formal meetings between the client and those involved in the support system. The CTI worker acts as a primary resource for all parties and assists them in devising a framework for resolving potential conflicts. For some clients, this period requires a renegotiation of treatment plans and a more active role for the CTI worker in facilitating the implementation of these plans. The *in vivo* monitoring role assumed by the worker may also be helpful in identifying specific clinical treatment issues (such as medication non-adherence) that may elude even the most caring office-bound clinician.

The final phase of CTI—*transfer of care*—focuses on completing the transfer of responsibility to community resources that will provide long-term support to the client. One of the aspects of CTI that differentiates it from services typically available to clients during transitional periods is that the transfer of care process is not abrupt; instead, it represents merely the culmination of work occurring over the full nine months. Throughout the intervention, the CTI worker has gradually reduced his or her role in
delivering direct services to the client in the community. The worker’s main function in this phase is to ensure that the most significant members of the support system meet together and, along with the client, reach a consensus about the components of the ongoing system of care. Ideally, this occurs at least one month before the end of the intervention. This gradual process ensures that the termination of CTI is not perceived by the client and the members of his or her support system as a sudden, potentially traumatic, loss.

The experimental intervention was delivered by three workers trained by some of the model developers. Two of the workers were bachelors level employees of the NY State Office of Mental Health re-assigned to this project from their regular duties. The third worker, who also performed some supervisory activities, was a medically-trained individual who had previously delivered CTI services in an earlier trial of the model. Weekly supervision was carried out by clinically-trained staff experienced in the CTI model.

Assessment of primary outcome

As noted above, housing status was assessed via face-to-face interviews conducted every six weeks for eighteen months. For those followed for the full eighteen months, this yielded a maximum of thirteen follow-up intervals during which the number of homeless nights were counted. We constructed a dichotomous variable indicating whether or not subjects had been homeless for at least one night during each of these intervals. We also examined the actual number of nights homeless reported by respondents during each interval, however the highly skewed distribution of these data led us to use the dichotomous measure in our main analyses.

Statistical analysis

Our primary analysis was an intent-to-treat (ITT) comparison testing whether there was a group-level difference between subjects assigned to the CTI and usual care groups on risk of homelessness at
the study’s endpoint. We compared outcomes during the final follow-up interval as well as during the final three follow-up intervals. These analyses were carried out using logistic regression models adjusting for baseline homelessness (number of homeless nights during the three month period preceding the index hospitalization). In order to obtain an unbiased estimate of receipt of a “high fidelity” version of the intervention, we also performed an as-treated analysis. This analysis was carried out via a two-stage instrumental variables regression in which assignment to experimental or control condition was the instrument and receipt of the high fidelity intervention was the treatment indicator. As in the ITT analysis, we compared outcomes during the final follow-up interval as well as during the final three follow-up intervals, adjusting for baseline homelessness.

Results

Sample

Baseline characteristics of the sample are summarized in Table 2. There were 150 participants (107 men [71.3%] and 43 women [28.7%], with a mean age of 37.5 (SD 9.5) years. The majority (62%) were African-American. Sixty-one percent had a lifetime diagnosis of schizophrenia, while 34.7 percent were diagnosed with schizoaffective disorder. This reflects the fact that the sample was drawn from persons who were previously homeless and difficult-to-place into housing. Co-morbid substance abuse was common; 50.3 percent of the sample met criteria for lifetime substance dependence and another 26.7 percent met criteria for lifetime substance abuse without dependence. Most subjects had extensive prior homelessness; 78.9 percent reported two or more previous homeless episodes and 34 percent reported five or more such episodes. Forty percent of subjects reported that the duration of their longest previous homeless episode was one year or longer. There were no marked differences at baseline between the CTI and the usual care group on any of these measures and none were statistically significant.
Study attrition and treatment receipt

Figure 1 summarizes the flow of subjects from screening through follow-up. Of the 150 subjects randomized, 77 subjects were assigned to the experimental condition (CTI) and 73 were assigned to the control condition (usual care). 58 subjects assigned to the experimental condition completed the eighteen month follow-up period, while 59 subjects assigned to the control condition completed the full follow-up period. Reasons for failure to complete follow-up are noted in Figure 1. Complete follow-up data were obtained for significantly more males than females (85% of males vs. 58.1% of females, (chi square 12.7, df 1, p=.001) and were also more likely to be those with a substance dependence diagnosis (91.3% of substance dependent vs. 61.4% of non-substance dependent, chi square 18.9, df 1, p<.001). There were no other group differences on baseline characteristics.

Some subjects assigned to the experimental condition did not receive all components of the intervention. In particular, a key ingredient of the CTI model is that post-discharge services are provided by a worker who has already established a relationship with the client before he or she is discharged from the institution to the community. Workers were instructed to establish this relationship via multiple face-to-face contacts with the subject during the pre-discharge period. In our previous work, we have established a threshold of at least three such pre-discharge contacts as minimally sufficient for this purpose (Conover Unpublished). In the current study, 55.8% subjects received three or more such contacts while 44.2% received two or fewer contacts. Of the 43 subjects who received three or more contacts, for 41 (95%) there was at least three weeks between randomization and discharge. In contrast, only 22 of the 34 subjects with two or fewer contacts (65%) spent three or more weeks in the TR following randomization. The failure to deliver the desired number of pre-discharge contacts was most often the result of limited time between subject randomization and discharge from the TR. As noted earlier, our original plan was to recruit subjects during their inpatient
stay (where, presumably, delivering adequate pre-discharge contacts would not have presented a
problem) but we instead recruited in the TR in response to changes in the discharge policy for homeless
patients.

Primary Analysis (ITT)

Of the 116 subjects with complete follow-up data, 31 (26.7%) experienced at least one homeless
episode during the course of the study. Figure 2 shows the proportion of subjects in each condition who
experienced at least one homeless night during each of the follow-up intervals. Using logistic regression
to model the impact of assignment to the CTI condition on endpoint homelessness (any homelessness
during the final three follow-up intervals) while controlling for baseline homelessness, the odds ratio for
treatment assignment was 0.22 (95% CI=.06, .88), indicating that assignment to CTI was associated with
a statistically significant five-fold reduction in homelessness risk. Repeating this analysis with endpoint
homelessness defined as any homelessness during the final follow-up interval, the odds ratio for
treatment assignment was 0.13 (95% CI=.02, 1.1), indicating that assignment to CTI was associated with
a trend toward a reduction in homelessness risk. We then repeated these analyses adjusting for sex,
etnicity and age and the results were unchanged.

Secondary Analysis (As treated)

In a secondary analysis, we then compared the outcomes of subjects assigned to the CTI
condition who received a “high fidelity” version of the intervention with experimental subjects who did
not receive the “high fidelity” treatment. Subjects were considered to have received the “high fidelity”
intervention if they had at least a minimally adequate level of pre-discharge contact with the CTI worker
as described above (n=42). Subjects who had no or minimal pre-discharge contact with the CTI worker
(n=35) were considered to have received the “low fidelity” version of the intervention. In order to
obtain an unbiased estimate of the impact of the “high fidelity” intervention while controlling for the
impact of all possible confounders, we employed an instrumental variables approach. We used a two-stage logistic model with homelessness during the last three intervals as the outcome, group assignment as the instrument, and receipt of the “high fidelity” intervention as the treatment, while adjusting for baseline homelessness. In this analysis, we found that receipt of “high fidelity” treatment was associated with a statistically significant ten-fold reduced risk of homelessness (OR = 0.10, 95% CI = .03, .35)

Discussion

This is one of very few rigorous trials of a carefully specified intervention designed to reduce the risk of recurrent homelessness among persons with SMI following discharge from inpatient psychiatric treatment. Our results support the findings of prior studies suggesting that CTI is an effective strategy for assisting formerly homeless individuals during the period of transition from institutional to community living. The magnitude of the protective effect was substantial, ranging from a five-fold reduction in homelessness risk in the intent-to-treat analysis to a tenfold reduction in the as-treated analysis.

As in our previous trial (Susser, Valencia et al. 1997), the results are consistent with our view that a targeted, time-limited intervention applied during a high-risk period can have a salutary impact that endures beyond the point at which the intervention ends. The notion that time-limited services can be effectively employed with persons with SMI has generally not been widely accepted by providers employing traditional ACT-based and other intensive case management approaches. This is understandable, particularly in light of an existing set of “best practice” guidelines suggesting that the chronic nature of schizophrenia and related illnesses typically requires that persons with such disorders receive ongoing (i.e., non time-limited) case management services (Mueser, Bond et al. 1998; McGrew, Pescosolido et al. 2003). The results we report here may, at least in part, reflect CTI’s limited primary
goal (preventing homelessness) as well as its emphasis on strengthening clients’ ties to existing services and supports in the community rather assuming direct ongoing responsibility for providing these supports. At the same time, we believe that the findings also support the importance of CTI workers’ establishing an effective personal relationship with their clients, preferably beginning before discharge, as a key ingredient in successfully implementing the intervention. This appears to be borne out most clearly by the as-treated analysis in which the impact of the intervention was doubled among those who received an adequate level of pre-discharge contact with the CTI worker in comparison with subjects who did not receive adequate pre-discharge contact.

It is important to recognize the central role played by contextual factors, both in affecting the way in which the intervention was delivered (i.e., limited time between assignment to CTI and discharge date prevented some clients from receiving a full “dose”) as well the ultimate effectiveness of the intervention as delivered. As described above, CTI is a model that relies to a great extent on mobilizing and coordinating existing services and supports in the community. It stands to reason, therefore, that its impact will be mediated to a significant degree by the availability and quality of these supports. The setting for this particular study, New York City, is one in which there is a comparatively rich but fragmented system of publicly-funded mental health, supported housing and social services available to persons with SMI, including those who are homeless or at high risk of homelessness. Thus, we cannot infer that the impact of CTI would necessarily be comparable in other urban or non-urban areas in which there are fewer existing services and supports to call upon.

Despite its significant strengths, the study has important limitations. First, as noted above, we were not able to deliver the full intervention to all subjects assigned to the experimental condition. This may account for the different pattern of results obtained relative to our original trial. In this study, it took some time for different outcomes between experimental and control groups to become apparent.
We attribute this to the fact that a significant number of experimental subjects did not establish an adequate connection with the CTI worker before leaving the TR and this delayed the effect of the intervention. Second, while the length of follow-up is relatively long by the standards of much clinical research, the degree to which the impact of CTI endures over a longer duration is unknown. Finally, homelessness is the sole outcome we examined. We have, however, collected data relevant to a number of other important domains that will be examined in subsequent analyses.

Conclusion

We have now shown in two randomized trials that CTI has a substantial effect on reducing the risk of recurrent homelessness in persons with SMI following institutional discharge, results consistent with others’ findings. While the need for comprehensive, long-term support for persons with SMI is undeniable, this work suggests that targeted, relatively brief interventions applied at a critical transition point may have enduring positive impacts. In the current study, we have applied such an intervention at one such time point—the transition from inpatient hospital treatment to the community. However, we believe that there are a number of other such “critical times” in the lives of persons with SMI at which such interventions may also be effectively deployed. For instance, evidence suggests that the period following release from correctional facilities is one of considerable risk for persons with SMI, during which CTI might also be fruitfully applied (Draine and Herman 2007). It is also possible that adaptations of the CTI model could be useful in transitions that, while not involving institutional discharge, nevertheless pose significant challenges to sustaining continuity of needed supports. For instance, it may be that similar approaches may be relevant for persons transitioning from more intensive service models, such as intensive case management or ACT, to less intensive ongoing sources of support (Salyers, Masterton et al. 1998). An adapted CTI approach might also be potentially useful with persons early on in the course of disorder, as one component of a comprehensive strategy to help individuals...
successfully engage with needed treatment and supports in the community following initial treatment for first-episode psychosis (Edwards, Cocks et al. 1999). Future research will be needed to determine if and how the CTI model can be successfully employed in these and other circumstances.
Table 1 Phases and Activities of Critical Time Intervention

<table>
<thead>
<tr>
<th>Phase</th>
<th>Transition</th>
<th>Try-Out</th>
<th>Transfer of Care</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Timing</strong></td>
<td>Months 1-3</td>
<td>Months 4-7</td>
<td>Months 8-9</td>
</tr>
<tr>
<td><strong>Purpose</strong></td>
<td>Provide specialized support &amp; implement transition plan</td>
<td>Facilitate and test client’s problem-solving skills</td>
<td>Terminate CTI services with support network safely in place</td>
</tr>
</tbody>
</table>
| **Activities** | • CTI worker makes home visits  
• Accompanies clients to community providers  
• Meets with caregivers  
• Substitutes for caregivers when necessary  
• Gives support and advice to client and caregivers  
• Mediates conflicts between client and caregivers | • CTI worker observes operation of support network  
• Helps to modify network as necessary | • CTI worker reaffirms roles of support network members  
• Develops and begins to set in motion plan for long-term goals (e.g. employment, education, family reunification).  
• Holds party/meetings to symbolize transfer of care |
Figure 1 Flow of Participants through Trial

1401 SCREENED

1251 EXCLUDED
1035 Ineligible
  509 not discharged to NYC
  202 not homeless
  324 other ineligible
  93 Refused
  123 Missed

150 RANDOMIZED*

77 EXPERIMENTAL
  42 high fidelity
  35 low fidelity

73 CONTROL

11 refused
  8 lost

7 refused
  5 lost
  2 deceased

58 COMPLETED F/UP

59 COMPLETED F/UP
Table 2 Baseline Characteristics of the Sample (N=150)

<table>
<thead>
<tr>
<th></th>
<th>Usual Care</th>
<th>CTI</th>
<th>Total</th>
</tr>
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<tbody>
<tr>
<td><strong>Sex</strong></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Female</td>
<td>18 (24.7)</td>
<td>25 (32.5)</td>
<td>43 (28.7)</td>
</tr>
<tr>
<td><strong>Ethnicity</strong></td>
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<td></td>
</tr>
<tr>
<td>African American</td>
<td>45 (61.6)</td>
<td>48 (62.3)</td>
<td>93 (62.0)</td>
</tr>
<tr>
<td>Latino</td>
<td>12 (16.4)</td>
<td>11 (14.3)</td>
<td>23 (15.3)</td>
</tr>
<tr>
<td>White</td>
<td>11 (15.1)</td>
<td>14 (18.2)</td>
<td>25 (16.7)</td>
</tr>
<tr>
<td>Other</td>
<td>5 (6.8)</td>
<td>4 (5.2)</td>
<td>9 (6.0)</td>
</tr>
<tr>
<td><strong>Age, y</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-29</td>
<td>14 (19.2)</td>
<td>19 (24.7)</td>
<td>33 (22)</td>
</tr>
<tr>
<td>30-39</td>
<td>26 (35.6)</td>
<td>25 (32.5)</td>
<td>51 (34)</td>
</tr>
<tr>
<td>40-45</td>
<td>17 (23.3)</td>
<td>19 (24.7)</td>
<td>36 (24)</td>
</tr>
<tr>
<td>46+</td>
<td>16 (21.9)</td>
<td>14 (18.2)</td>
<td>30 (20)</td>
</tr>
<tr>
<td><strong>Diagnosis</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Schizophrenia</td>
<td>44 (60.3)</td>
<td>48 (62.3)</td>
<td>92 (61.3)</td>
</tr>
<tr>
<td>Schizoaffective</td>
<td>28 (38.4)</td>
<td>24 (31.2)</td>
<td>52 (34.7)</td>
</tr>
<tr>
<td>Other</td>
<td>1 (1.4)</td>
<td>5 (6.5)</td>
<td>6 (4.0)</td>
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<tr>
<td><strong>Substance abuse</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No use or dependence</td>
<td>7 (9.6)</td>
<td>8 (10.4)</td>
<td>15 (10)</td>
</tr>
<tr>
<td>Use without abuse or dependence</td>
<td>3 (4.1)</td>
<td>12 (15.6)</td>
<td>15 (10)</td>
</tr>
<tr>
<td>Abuse without dependence</td>
<td>22 (30.1)</td>
<td>18 (23.4)</td>
<td>40 (26.7)</td>
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<td></td>
<td>Group A</td>
<td>Group B</td>
<td>Group C</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>---------</td>
<td>---------</td>
<td>---------</td>
</tr>
<tr>
<td>Dependence</td>
<td>41 (56.2)</td>
<td>39 (50.6)</td>
<td>80 (53.3)</td>
</tr>
<tr>
<td>Previous homeless episodes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>One</td>
<td>13 (18.1)</td>
<td>18 (24)</td>
<td>31 (21.1)</td>
</tr>
<tr>
<td>Two to four</td>
<td>37 (51.4)</td>
<td>29 (38.7)</td>
<td>66 (44.9)</td>
</tr>
<tr>
<td>Five to nine</td>
<td>12 (16.7)</td>
<td>18 (24)</td>
<td>30 (20.4)</td>
</tr>
<tr>
<td>Ten or more</td>
<td>10 (13.9)</td>
<td>10 (13.3)</td>
<td>20 (13.6)</td>
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<td>Longest homeless episode</td>
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<td></td>
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<tr>
<td>Less than one week</td>
<td>6 (8.6)</td>
<td>7 (9.3)</td>
<td>13 (9)</td>
</tr>
<tr>
<td>One week to three months</td>
<td>16 (22.9)</td>
<td>16 (21.3)</td>
<td>32 (22.1)</td>
</tr>
<tr>
<td>Three months to one year</td>
<td>23 (32.9)</td>
<td>19 (25.3)</td>
<td>42 (29)</td>
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<tr>
<td>One year or more</td>
<td>25 (35.7)</td>
<td>33 (44)</td>
<td>58 (40)</td>
</tr>
<tr>
<td>Age first homeless (mean, SD)</td>
<td>26.6 (8.6)</td>
<td>25.1 (10.8)</td>
<td>25.8 (9.8)</td>
</tr>
<tr>
<td>Nights homeless preceding index hospital admission (90 maximum, mean, SD)</td>
<td>48.1 (40.7)</td>
<td>47.6 (38.1)</td>
<td>47.8 (39.2)</td>
</tr>
</tbody>
</table>
Figure 2  Percent of Subjects with Any Homelessness During Each Follow-Up Interval (18 months)
References


