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# Impact of a supported housing prioritization system using vulnerability and high service utilization

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**ABSTRACT**
For people experiencing chronic homelessness, supportive housing with intensive social, health, and behavioral health services reduces the likelihood of re-entering homelessness and the public costs of associated acute medical care, shelter use, and incarceration. Due to a limited supply of supportive housing, it must be allocated to those most in need. This paper examines findings from a unique, region-wide method for prioritizing individuals for supportive housing based on utilization of high-cost public services and vulnerability if left on the street. A sample of 196 individuals were prioritized for housing based on this method, while a comparison group of 102 were housed not using the method. Results showed that those housed under the prioritization method achieved greater reductions in utilization of high-cost public services, but were also less likely to have positive dispositions when exiting the housing programs, suggesting the need for a greater intensity of supports and/or multiple "doses" of supportive housing before stability can be expected. The method described in the paper can provide a starting point for developing regional, comprehensive systems of coordinated, prioritized entry into supportive housing, such as those now required by US Department of Housing and Urban Development.

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Over half a million people are homeless on any given night in the United States, 23 percent of who have chronic patterns of homelessness (U.S. Department of Housing and Urban Development, 2013). For this population, supportive housing with intensive social, health, and behavioral health services reduces homelessness and the associated public costs associated of acute medical care, shelter use, and incarceration (Culhane & Byrne, 2010; Larimer et al., 2009). However, there is not enough supportive housing to meet the need. The situation calls for a systematic method for prioritizing those most in need of supportive housing.

Without clear prioritization methods, housing providers often select individuals who may be less challenging to serve or who are already known to the provider. First come-first served methods tend to reach only the most visibly homeless such as those using campsites, parks, shelters, or meal programs. It overlooks people who may cycle through institutional settings or who not as visible. Long wait lists and re-application requirements also inadvertently neglect those who may not be able to withstand these requirements. Criminal history and housing "readiness" criteria such as achievement of sobriety or psychiatric stability are also common, despite little evidence that these criteria predict behavior as a tenant or housing stability (Malone, 2009; Tsai & Rosenheck, 2013; Tsai, Kasprow, & Rosenheck, 2014).

Two prioritization methods have emerged for managing access to supportive housing based on need. The first prioritizes people based on use of high-cost public services, such as emergency departments (EDs), psychiatric hospitals, and jails. This is a compelling method for a number of reasons. First, estimates suggest that 10–20 percent of the homeless population accounts for 56–60 percent of public service costs, making this an economically valuable subpopulation to target (Flaming, Burns, Sumner, Moreno, & Toros, 2011; Poulin, Maguire, Metraux, & Culhane, 2010). High public service use also indicates on-going crises which could be mitigated by supported housing. Large cost-offsets (60–86%) result when such individuals are housed (Aidala, McAllister, Yomogida, & Shubert, 2013; Culhane, Metraux, & Hadley, 2002; Flaming, Burns, Sumner, Moreno, & Toros, 2012; Srebnik, Connor, & Sylla, 2013).

The second methodology prioritizes people to supportive housing based on their vulnerability to victimization, ill health, and/or mortality if left on the streets. This method helps identify individuals at risk for negative outcomes who might not otherwise be visible or high service users (Ginzler & Monroe-Devita, 2010; Hwang et al., 1998; Spence-Almaguer, Cronley, & Petrovich, 2013). This method also avoids incentivizing service utilization as the sole pathway to supportive housing.

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King County, Washington has implemented a unique prioritization methodology that considers both prior service utilization and vulnerability. The model, dubbed Client Care Coordination (CCC) involves stakeholder partnership, blended public-private funding, efficient use of centralized cross-sector administrative data (jail, sobering, shelter, emergency room, hospital), use of a standardized vulnerability assessment, and a scoring system for rating service utilization and vulnerability (Sylla, Franzen, Srebnik, Hoffman, & Shoenfeld, 2016).

This paper examines the system and individual-level impacts of CCC prioritization. At the system level, we hypothesize that the units leased under the CCC model will house individuals with more high-cost public service utilization and greater vulnerability than a comparison group of units filled without using the CCC prioritization strategy. If the hypothesis is true, this would show that the CCC model more equitably allocates scarce resources to those most in need. We further hypothesize that those placed by the CCC method will show greater reductions in utilization of high-cost public services, which is clearly a public benefit.

At the individual level, the literature suggests that criminal history, psychiatric stability, and substance use are not strong predictors of housing stability (Malone, 2009; Tsai & Rosenheck, 2013; Tsai et al., 2014). As such, we believe that given the right supports, a person's challenges of prior vulnerability and/or service utilization can be overcome. As such, we hypothesize that there will be no difference between the comparison group and those selected using the CCC model regarding retention in permanent supported housing and the nature of exit dispositions from housing.

## Methods

### Sample

During the first few years of CCC implementation (2010–12), it was common that a given housing provider would have a contracted percentage of units that were required to be filled via the CCC process and the remaining units could be filled using the housing provider's usual criteria, creating a natural comparison group. As such, this paper is based on CCC participants 2010–12 ($n = 196$) and a comparison group of non-CCC individuals ($n = 102$) housed in the same five supportive housing programs.

### Measurement of vulnerability

To assess vulnerability, the CCC model uses the Vulnerability Assessment Tool (VAT) which measures ten domains including: mental health, substance abuse, cognitive organization/orientation, survival skills, medical risk, mortality risk, ability to communicate needs, ability to meet basic needs, negative social behaviors, and homelessness history. The VAT has adequate internal consistency and inter-rater reliability (Ginzler & Monroe-Devita, 2010). The VAT is used to determine scoring and eligibility of an individual if the person does not already meet high service use criteria. However, in some instances, an individual may already have a VAT score as some programs choose to use the tool for non-CCC clients as well.

### Measurement of service utilization

An individual's service utilization during the past year is used within the CCC prioritization model. First, each individual is assigned service "scores" (0–10) based on their utilization of the following institutions/services during the prior year relative to utilization percentiles of all users of the given service/institution: jail bookings, jail days, psychiatric hospital admissions and days, ED visits, medical hospital admissions and days, medical respite stays, shelter nights, and sobering center admissions. These scores are summed to create a composite score (a detailed description is provided in Sylla et al., 2016).

Service utilization data are derived from administrative data. Specifically hospital utilization, shelter night, and sobering center admissions are held by King County's Department of Community and Human Services (DCHS), which conducted the analysis for this study. Jail booking and release data are provided to DCHS on a daily basis for the purpose of care coordination and was used for this analysis by permission. ED and medical hospital admissions were obtained from the local public hospital via individual participant consent.

### Prioritization rubric

Composite service utilization scores and VAT scores are compared against high, medium, and low scoring "bands" corresponding to composite score and VAT percentile ranges for all people in the CCC service use database as of 2010. The "high band" is set at the composite score of the top 20th percentile of this group (a composite score of 14+ or vulnerability score of 25+). The "medium band" is set as the 21st–40th percentile (composite score 10–13 or vulnerability score 22–24) and the "low band" is based on those lower than the 40th percentile of utilization. To be eligible for a CCC supportive housing unit, an individual must have a composite service utilization score in the high band, a VAT score in the high band, or a score in the medium band or both (Sylla et al., 2016).

### Data analysis

To determine whether the CCC model results in housing individuals with higher prior service utilization and

vulnerability than those housed not using the model, we compared the participants and the comparison group on utilization of service sectors/institutions described above as well as the use of psychiatric emergency service encounters. Between-group differences were examined using *t*-test comparisons.

To examine reductions in service utilization, we compared utilization during the year prior to that during the year following housing placement, for participant and the comparison group using the same cross-sector data described above. Between-group difference in the rate of service utilization change over time was analyzed using *t*-tests for equality of mean pre-to-post change as well as analysis of covariance.

Between-group differences in housing retention were analyzed using *t*-test comparisons for individuals who had left the intensive supportive housing programs. Between-group differences in the type of exit ("good" or "bad") were examined using chi-square analysis. "Good" exits were those involving moving to "completing" services and moving to other permanent housing. "Bad" exits involved leaving the housing program due to rule non-compliance, criminal activity, non-payment of rent, or death.

## Results

### Sample characteristics

Demographics of CCC participants and the comparison group are shown in Table 1 below.

CCC participants were significantly more likely to be female and also slightly (but significantly) younger than the comparison group.

**Table 1.** Sample demographics.

| Characteristic | Participants ($N = 196$) | Comparison group ($N = 102$) | Test |
|---|---|---|---|
| Average age (SD) | 46.44 (13.42) | 51.17 (9.96) | $t = 3.15$; df = 296; $P < .01$ |
| Gender (% female) | 31% | 18% | $X^2 = 6.41$; df = 1; $P = .01$ |
| Ethnic minority % | 75% | 68% | $X^2 = .59$; df = 1; n.s. |

### Differences in system utilization and vulnerability at baseline

Utilization of high-cost public service during the year prior to housing program move-in is shown in Table 2 below.

Consistent with our hypothesis, participants showed significantly greater baseline utilization of every service sector than the comparison group of individuals in the same housing programs. These baseline differences support the hypothesis that without a system that deliberately prioritizes individuals with high service utilization, housing providers are likely to revert to housing individuals with less challenging patterns of utilization.

Only eight individuals in the comparison group had had a VAT administered at the time of this study as the VAT was not a standard part of care unless the person was being considered for CCC placement. As such, we were not able to examine group differences on the VAT. Alternatively, we analyzed the correlation between the VAT and the service utilization composite score for the subgroups of participants ($N = 79$) and additional individuals ($N = 187$) housed in similar supported housing programs who had both VAT and service utilization scores in the CCC database during the study period. The correlation between the VAT and service utilization composite scores for this group ($N = 266$) was $r = .224$. This correlation was statistically significant ($P < .01$), however, it is quite small. This modest relationship suggests that vulnerability and service utilization are independent constructs and should be considered separately in a model for prioritizing individuals for supported housing.

### Change in service utilization

Change over time in utilization of high-cost public services was examined using ANCOVAs and *t*-tests for equality of mean pre-to-post change. ANCOVAs, which adjust for baseline values, were run for each service utilization domain. These analyses did not find that the slope of pre-to-post reduction in utilization was steeper for the CCC participants than the comparison group; however, the data's non-linearity was such

**Table 2.** Baseline service utilization.

| | Participants ($N = 196$) | | Comparison group ($N = 102$) | | Test | | |
|---|---|---|---|---|---|---|---|
| Utilization domain | Average | SD | Average | SD | Test | Df | Sig. |
| Jail bookings | 1.70 | 2.75 | .33 | .78 | $t = -6.49$ | 247.85 | $P < .01$ |
| Jail days | 37.95 | 75.26 | 4.25 | 18.46 | $t = -5.94$ | 236.58 | $P < .01$ |
| Psychiatric hospital admissions | 0.20 | 0.67 | 0.03 | .22 | $t = -3.32$ | 262.49 | $P < .01$ |
| Psychiatric hospital days | 5.79 | 23.81 | 0.60 | 5.75 | $t = -2.89$ | 235.41 | $P < .01$ |
| Sobering center encounters | 10.33 | 31.91 | 2.27 | 11.22 | $t = -3.18$ | 269.35 | $P < .01$ |
| Psychiatric emergency encounters | 0.27 | 0.79 | 0.04 | 0.20 | $t = -3.81$ | 237.55 | $P < .01$ |
| Shelter nights | 22.46 | 65.40 | 10.64 | 38.66 | $t = -1.96$ | 291.30 | $P = .05$ |
| ED episodes | 3.75 | 6.72 | 0.97 | 2.24 | $t = -5.25$ | 263.82 | $P < .01$ |
| Medical hospital admissions | 0.72 | 1.70 | 0.18 | 1.13 | $t = -3.29$ | 278.58 | $P < .01$ |
| Medical hospital days | 3.47 | 9.15 | 0.80 | 6.94 | $t = -2.82$ | 257.28 | $P < .01$ |

**Table 3.** Change in service utilization.

| Utilization domain | Mean pre to post difference | Standard error difference | *t*-test for equality of mean pre-to-post change | df | Sig. (2-tailed) |
|---|---|---|---|---|---|
| Psychiatry hospital admissions | 0.09 | 0.04 | 2.02 | 235.5 | 0.05 |
| Psychiatric hospital days | 1.66 | 1.06 | 1.56 | 290.5 | 0.12 |
| Jail bookings | 0.56 | 0.17 | 3.22 | 288.1 | <.01 |
| Jail days | 16.41 | 4.85 | 3.38 | 261.2 | <.01 |
| Sobering center encounters | 7.74 | 2.41 | 3.21 | 258.5 | <.01 |
| Psychiatric emergency encounters | 0.17 | 0.05 | 3.25 | 236.7 | <.01 |
| Shelter nights | 9.45 | 6.08 | 1.55 | 292.4 | 0.12 |
| ED episodes | 1.82 | 0.42 | 4.32 | 248.4 | <.01 |
| Medical hospital admissions | 0.26 | 0.14 | 1.83 | 296.0 | 0.07 |
| Medical hospital days | 0.09 | 1.01 | 0.09 | 295.2 | 0.93 |

that goodness-of-fit assumptions for conducting ANCOVA analyses were not met. This was due to the very large differences in variance between the two groups, in part, due to baseline between-group differences that were intended by the model.

Results for *t*-tests for equality of mean pre-to-post change are shown in Table 3 below. While the *t*-tests cannot adjust for baseline values, they are more robust to departures from data linearity.

Table 3 shows that CCC participants showed greater mean reductions in utilization than did the comparison group on nearly all service utilization measures, including psychiatric hospital admissions, jail bookings and days, sobering center encounters, psychiatric emergency encounters, ED encounters, and at the trend level for medical hospital admissions. In sum, we see that CCC participants showed greater service utilization reductions than individuals placed into housing not using the CCC model, but that these differences are reduced when we attempt, albeit without meeting statistical model assumptions, to control for baseline values. These results are to be expected given the CCC model design that selects individuals, in part, on the basis of high prior service utilization which allows this group more statistical "opportunity" to improve.

### *Housing retention and exit disposition*

Between-group differences regarding housing retention and the nature of exit disposition for individuals who had left the housing program are shown in Table 4 below.

Contrary to our hypotheses, participants had shorter program retention (length-of-stay), and were less likely to have "good" program exit dispositions than the comparison group. Participants were more likely to have non-compliance exits and to have died or gone to jail than the comparison group. It is clear that participants came to housing with substantially more challenging backgrounds, and it is possible that they needed more support than the programs provided to maintain and stabilize within the housing programs. Participants, did however, reduce the extremely high service utilization that they had experienced prior to being housed.

**Table 4.** Exit disposition and housing retention.

| Utilization domain | Participants ($N = 112$)* | Comparison group ($N = 34$)* | Test | df | Sig. |
|---|---|---|---|---|---|
| % "Good" exits | 21% | 68% | $X^2 = 23.67$ | 1 | $P < .01$ |
| Average length-of-stay in program (SD) | 454.43 (284 = 67) | 605.56 (336.50) | $t = 2.60$ | 144 | $P = .01$ |

*Percentages and statistical tests are derived for the subgroup of individuals who exited.

## Discussion

This paper describes the system-level and individual-level impacts of a unique, region-wide method for prioritizing individuals for scarce supportive housing resources using both individual's prior utilization of high-cost public services and assessed vulnerability.

Analysis shows that the method successfully results in allocating supportive housing to those with greater need. While this result is not a surprise given that the project design selected for individuals with greater need, it is nevertheless important to demonstrate that the model and processes can equitably address both the economic issues presented by high service utilization as well as the more subtle issues associated with individual vulnerabilities.

We also showed that the CCC model resulted in greater reductions in utilization of high-cost public services for participants relative to those placed in the same housing without the use of the prioritization method. The substantial service use reductions shown by participants also represent considerable reductions in public sector costs. Indeed, a separate analysis of the first 180 individuals placed using the CCC method showed a reduction of $2.8 million dollars in utilization of high-cost public services comparing the year prior to and year following housing entrance (King County, Department of Community and Human Services, 2012). It should be noted that the utilization reductions found in the current study are attenuated when we attempt to control for baseline service use. This is to be expected as the CCC model selects individuals

with high prior service utilization who thus have greater latitude to reduce such utilization. Is it notable, however, that the between-group differences in service use reductions were found despite the CCC model also prioritizing individuals who have high vulnerability without high service utilization.

Contrary to our hypotheses, those placed using the CCC method had shorter housing tenure and were less likely to have a positive exit disposition than the comparison group. It is likely that the higher incidence of these negative outcomes is due to greater clinical severity and service challenges of the participant group as evidenced by their substantially higher prior service utilization.

Study conclusions are limited by its non-randomized design. For example, we cannot generate causal conclusions about the impacts of the CCC model, and regression to the mean is a notable alternative hypothesis. Our analysis does suggest, however, at least an association between the CCC model and expected impact. Also, by selecting individuals with greater need upon entry into housing, the model had the unintended consequence of selecting individuals who were more likely to have challenges while in housing, leading to the finding of a higher incidence of negative outcomes for individuals placed by the CCC model. While a randomized design would have been optimal for determining impact, the intervention occurred at a system level and was in itself intended to create non-equivalent groups of people, making randomization, or fully controlling for baseline characteristics, both infeasible and contrary to the purpose of the model and study.

Findings from this study have a number of implications for policy and practice. At the policy level, the study describes a promising model for prioritizing individuals for supported housing based on equitable criteria of clinical need and high-cost public service use. The declines in service utilization shown for participants also represent considerable reductions in public sector costs. Although we are not able to determine the extent to which service use reductions following supported housing placement are a function of regression to the mean, there are other studies that control for this and show cost-offsets of supported per se (e.g. see review by Ly & Latimer, 2015). For the current study, the policy issue is whether it makes sense to design a supported housing prioritization model that focuses on people with prior high service use as well as people who are vulnerable but without high service use. Our findings suggest that not only is such a model equitable and transparent, it is fiscally prudent, as it targets individuals who show greater overall reductions in use of high-cost services. Others have made similar arguments for prioritizing individuals based on high prior service use (e.g. Aidala et al., 2013; Flaming et al., 2012). Additionally, the model described is feasible and cost-efficient to implement, relying primarily on centralized administrative data. Notably, the US Department of Housing and Urban Development (HUD) now requires regionally coordinated systems to prioritize individuals for supportive housing in order to be competitive for federal homeless funds. The CCC model described in this paper can provide a starting point for systems working to develop a comprehensive system of coordinated, prioritized housing entry to fulfill this mandate. Indeed, since this analysis, in order to comply with HUD directives, King County has moved to a single coordinated entry system for all individuals seeking homeless housing, incorporating learnings from the CCC model.

At the practice level, three implications emerge. First, it should be noted that using any type of prioritization model for supported housing will, by definition, leave some individuals without this important resource. Using a CCC-type prioritization model, those not receiving supported housing could likely benefit from less intensive resources such as housing vouchers to address financial instability and/or housing case management to prevent eviction. Second, the type of prioritization method described in this study might create the unintended consequence of people needing to, or being encouraged to, decompensate or seek out use of high-cost services without sufficient need in order to get housing. Unfortunately, the issue of "striving toward eligibility" would be true for any program that used defined eligibility criteria. Despite these limitations, it is our belief that using an equitable method of prioritization for this type of limited resource is preferable to not using a prioritization method at all. Finally, our finding that those placed by the CCC model had shorter housing tenure and were less likely to have a positive exit disposition suggests that such individuals may need even greater supports than were provided in the supportive housing programs examined. However, it is also possible, that even with highly supported housing some individuals may also need more than one stay, or "dose", before they are fully stabilized. Our results do show some indication of participants' stabilization, given their notable reduction in high-cost public services. That said, it is clear that when individuals are systematically prioritized for housing based on high needs and utilization, housing programs will likely need to ramp up service intensity to successfully support tenants.

Ultimately, the goal of every locality should be to have enough housing and supportive services for all who need. Until that time, implementing such a prioritization model can equitably provide these resources to people who need them most, reducing the instability that results in high-cost public service use, and helping to break the cycle of chronic homelessness.

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This work was supported by King County Department of Community and Human Services.

## Notes on contributors

***Dr. Srebnik*** has over 20 years of program evaluation experience and has served as a program evaluator for King County's Behavioral Health and Recovery Division since 2003. She has conducted program and system-level evaluations related to behavioral health, criminal justice, and housing services. She is also a Clinical Associate Professor within the University of Washington, Department of Psychiatry and Behavioral Sciences. In that capacity she has conducted clinical and services research, and worked with state and local human services departments to develop outcome indicators and performance metrics.

***Laurie Sylla*** manages the work of King County's Behavioral Health and Recovery Division, System Performance and Evaluation section. She oversees program evaluation and quality improvement initiatives that span behavioral health, housing, health, and criminal justice service sectors. In addition, she is involved in development and evaluation of system-level quality improvement projects and performance metrics.

***Marla Hoffman*** serves as a statistician for King County's Behavioral Health and Recovery Division. She conducts statistical analyses and provides other technical support for specific staff and external projects and investigates system-wide performance, including clinical care issues: She plans, designs, and executes analysis projects focused on system-wide issue and collaborates with others regarding data management, data development, and maintaining data integrity.

***René Franzen*** has worked for King County Behavioral Health and Recovery Division since 2008. She has more than 30 years of experience in health care, with emphasis in mental health, and in the past 5 years, with housing and homelessness. Her responsibilities for King County include design of a high utilizer database and development of a scoring system to prioritize individuals who frequently use public safety systems and/or are vulnerable.

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