Cost-Effectiveness of a Homeless Care Transition Program: Durham Homeless Care Transitions

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BACKGROUND Transitional care and medical respite programs provide assistance to people experiencing homelessness as they move from acute care into community settings. These programs can address issues that may fall outside the reach of traditional medical care yet have a profound impact on the health of vulnerable populations. This article focuses on the cost-effectiveness of the Durham Homeless Care Transitions (DHCT) program.

METHOD This intervention study of the DHCT program uses a comparison group of people experiencing homelessness who were referred but did not participate. Encounter-level data, aggregated by quarterly segments of charges and reimbursements, were abstracted for all persons referred. Descriptive statistics were computed and models of charges and reimbursements were created using ordinary least squares (OLS) regression to compare utilization for 12 months pre- and post-referral.

RESULTS Patients referred to the DHCT program (N = 485) were primarily non-Hispanic Black (62.5%), male (68.4%), uninsured (35.5%), and had an average of 5.3 chronic conditions and an average age of 50.0 years (SD = 11.3). There was variability among charges and reimbursement based on health care visit type but a negative association between treatment and charges, indicating that being part of the DHCT program led to lower charges post-referral.

LIMITATIONS The study is limited by lack of access to line-item details of charges, reimbursement, and payer mix.

CONCLUSION There is evidence of benefit to patients from transitional care and medical respite programs that does not substantially increase the overall societal cost of care; however, health systems commonly require evidence of cost savings and benefit as a return on investment.

Homelessness is a substantial risk factor for poor health and early mortality [1, 2]. People experiencing homelessness (PEH) have increased emergency department (ED) utilization [3], more frequent hospital admissions and increased bed days [4], and increased discharge delays [5] compared with the general population. The prevalence of trimorbidity (co-occurring chronic illness, mental illness, and substance use disorder) in PEH is increasing [6], indicating higher patient complexity. Homelessness at discharge is a risk factor for hospital readmission [7–9].

Homeless medical respite and transitional care programs provide a safe place for PEH to rest and heal during illness or injury, primarily upon hospital discharge. The National Health Care for the Homeless Council (NHCHC) provides details of 130 such programs in their Homeless Medical Respite Directory, including 5 in North Carolina [10]. There are multiple types of medical respite programs (e.g., freestanding, shelter-based, scattered sites), which typically reflect community needs and resources shared from supporting institutions. In 2016, after a 2-year pilot program [11], the Durham Homeless Care Transitions (DHCT) program was instituted in Durham, North Carolina, to provide continuity of care and connection to resources for PEH with ongoing medical needs.

Cost-Benefit of Homeless Medical Respite and Transitional Care Programs

Studies have used a variety of methods to demonstrate cost savings of homeless medical respite or transitional care programs. For example, Beieler and colleagues substituted reduced hospital bed day expenditure with medical respite operating costs to demonstrate an average of $25,000 in cost savings per patient experiencing homelessness and undergoing parenteral antimicrobial therapy; they primarily relied on a proxy per-day savings for an inpatient stay rather than an insured patient stay [12]. Another study estimated both direct care and administrative costs of medical respite as well as predicted hospital costs based on patient diagnoses and determined that hospitals could save $18,000 to $48,000 per day as cost avoidance if alternative housing for recuperation was provided [13]. Basu and colleagues performed an expanded cost analysis that incorporated costs

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for a variety of health and social services and estimated an annual net cost savings per patient experiencing homelessness of $6307 using a per-day cost avoidance aggregate [14]. Similarly, researchers in Denmark conducted a randomized controlled trial and estimated elective health care costs, acute health care costs, and social costs in their analysis. They found significant decreased cost among patients experiencing homelessness who were enrolled in a 2-week medical respite program versus those who were not enrolled [15]. To address the effects of varying levels of Medicaid coverage, Shetler and Shepard contrasted cost savings in states with and without Medicaid expansion [16]. Using the cost of the second-to-last day of each patient's hospital stay as a representation of their average inpatient costs per day, the authors calculated cost savings as a multiple of the decrease in hospital length of stay associated with medical respite for each patient. After including cost savings associated with reductions in future ED visits and inpatient admissions, they found that the gross savings for the health system with Medicaid expansion would be $8949, and savings for the health system without Medicaid expansion would be $13,203 per medical respite stay [16]. This extensive study involved access across hospital charges, revenue, and accounting costs that research groups typically do not have; it informs key differences in accounting and shows how offsets could be better managed between hospital and payer/Medicaid patients.

Current Study

The aim of this study was to ascertain whether the Durham Homeless Care Transition (DHCT) program provided any change in health care charges and reimbursements with the goal of assessing cost-effectiveness of the program with aggregated available data. Earlier studies relied on estimation, which explains the wide range of values of cost savings in terms of charge avoidance; however, the demonstration of cost savings associated with homeless medical respite and/or transitional care programs was consistent. Here, we conducted a quasi-experimental study of the program using 2 groups: those who took part in the DHCT program (treatment) and those who were referred but did not take part in the program (control). This study investigates the charges among those persons who received the intervention and also compares a similar group of people who did not receive the intervention. In particular, 2 hypotheses were stated: 1) health care charges would *decrease* from pre-program to post-program, due to changes in utilization (e.g., more office visits and less inpatient days); and 2) health care reimbursement would *increase* from pre-program to post-program due to changes in insurance status over time.

Method

The Durham Homeless Care Transitions Program (DHCT)

DHCT processes and programmatic outcomes have been previously described in the literature [17]. DHCT began as a 9-month intensive case management program with the goal of connecting homeless patients to needed community-based services and supports (e.g., primary care, substance abuse services, mental health care, housing, income, family/friends/community groups). In 2018, DHCT began testing a novel triage mechanism to better match patient needs with available resources and also tailor the program length of duration based on need, which for some patients is less than the original 9-month program. DHCT is designed for people who are competent in activities of daily living and would be discharged to a home if one were available. The majority of DHCT patients are referred by complex care coordinators within the Duke University Health System (DUHS) through an electronic survey. Upon referral notification, the DHCT clinical director, a DUHS employee, reviews the patient's chart and determines whether they meet program eligibility criteria; if so, plans for a safe hospital discharge commence, and if not, the DHCT clinical director provides expert consultation to facilitate a safe discharge plan. To meet DHCT program eligibility, the patient must be experiencing homelessness; able to participate in and maintain a safe and harm-free environment; able to follow rules of the housing setting, which may include abstinence from drugs and/or alcohol; willing to participate in case management visits and a treatment plan; competent in activities of daily living (e.g., able to self-toilet, able to prepare simple meals); psychiatrically stable (e.g., no active threats of harm to self or others); and cleared by physical therapy for home discharge when/if applicable.

Prior to 2021, DHCT was primarily funded through external philanthropic foundation grants in addition to some financial support from Durham County and DUHS, the clinical flagship health system. In 2021, DUHS invested in the program. DHCT is administratively housed within Project Access of Durham County (PADC), a nonprofit organization whose mission is to improve the health of uninsured and underinsured Durham County residents. PEH who are childless adults often cannot obtain health insurance through Medicaid or an employment source, creating a barrier to care. PADC facilitates DUHS provision of community benefit through uncompensated care, which is a requirement of DUHS's nonprofit tax status.

Data Collection and Measures

We downloaded the full name, date of birth, and DUHS medical record number for all patients referred to DHCT during the study time period into an Excel spreadsheet that was shared with, 1) the Duke Health Technology Solutions Analytics Center of Excellence (DHTS ACE) for matching within the DUHS electronic health record (EHR) and abstraction of demographic, encounter, and diagnoses data; and 2) the DUHS cost accounting system to obtain charges and collections 1 year prior to and 1 year after referral date. This allowed our analysis of comparative cost reduction without line-item insurance/payer status, which is not available for

research purposes. Although we could not obtain line-item details of the charges and collections, we were able to categorically separate 1-year and 6-month increments of care utilization for comparison. All data were delivered into Duke University's Protected Analytics and Computing Environment (PACE), where the protected health information was being analyzed for a separate study of clinical effectiveness being conducted by the authors as well as undergoing the cost-effectiveness comparison for this study. The diagnoses were categorized using the Elixhauser Comorbidity Index (ECI), which was initially developed to define clinical comorbidities associated with hospital length of stay, hospital charges, and in-hospital death [18]. The algorithm includes 30 distinct comorbidities classified by International Classification of Diseases, Tenth Revision (ICD-10) [19], and is widely used in health services research [20].

Setting and Participants

This is an intervention study in which all patients who were referred to DHCT from July 1, 2016, through June 30, 2020, (N = 485) were included. Across all referrals, 68% were male while 31% identified as female; 62% were non-Hispanic Black, and 30% were non-Hispanic White. The average age of all referrals was 50 years (SD = 11). At referral, 40% were on public insurance and 37% were uninsured. The Duke Health Institutional Review Board approved all study procedures.

Statistical Analysis

Persons who were enrolled into DHCT (treatment) were compared to those who were referred but did not enroll (control); the 2 groups were non-randomly assigned. Chi-square tests were used to assess differences between treatment and control groups with regard to categorical data, and independent t-tests were used to assess continuous mean differences between the treatment and control groups. After descriptive statistics were reviewed, models of charges and reimbursements were run using OLS regression,[a] modeling in sequential order: 1) demographics, 2) health conditions, and 3) visits. All analyses were conducted in SAS, version 9.4 (Cary, NC).

Results

Those individuals who were enrolled into DHCT (treatment) were primarily male (75%) and non-Hispanic Black (69%); their mean age was 51 years at time of referral. A majority of the treatment group had hypertension (77%) and substance use disorder (76%), and almost half had diabetes (49%) and chronic pulmonary disease (47%). Nearly 50% had public insurance at referral, and another 23% were uninsured. In this treatment group, the average health care charges for the 12 months before the program were over $60,000, and the reimbursements for the same time averaged $7000 (Table 1).

There were significant differences between treatment and comparison groups at pre-12-month referral. Those in treatment were more likely to have pulmonary circulation disorders (χ^2 = 5.01, P = .03), chronic pulmonary disease (χ^2 = 4.57, P =.03), diabetes (χ^2 = 8.79, P = .003), and substance use disorder (χ^2 = 4.18, P = .04), as well as higher numbers of reported related chronic conditions compared to the control group (t = 3.51, P = .0005). Utilization was higher in the treatment group compared to the control group prior to program enrollment across multiple visit types including observation, office, and ED.

Charges

The 3 sequential OLS models for charges demonstrated an R^2 from .18 in Model 1 to .27 in Model 3 (Table 2). There was positive association between the number of medical conditions and charges (b = 6945, t = 2.15, P < .001), indicating nearly $7000 charged per condition. There was also a positive association between the number of office visits and charges post-program. People who were enrolled in DHCT (treatment) had, on average, $23,069 fewer charges after controlling for pre-program level of charges, demographics, conditions, and utilization. It is important to note that none of the demographics or condition types were significant in any of the models.

Reimbursement

The 3 OLS models for reimbursements had R2 from .23 in Model 1 to .45 in Model 3 (Table 3). There were positive associations between the number of conditions and reimbursement (b = 3752, t = 5.85, P < .0001), indicating almost $4000 more in reimbursements for those individuals with a higher number of conditions. There was a negative association between specific diseases (chronic pulmonary disease, diabetes, hypertension, substance use) and reimbursement, indicating that there was less money reimbursed for those conditions (ranging from $4000 to $10,000). At post-referral, there was a positive association for inpatient admissions (b = 5553, t = 6.36, P < .0001), observation admissions (b = 3793, t = 6.40, P < .0001), and reimbursement. Prior to controlling for conditions and utilization, the intervention, on average, received $5110 more per person in reimbursements; however, this finding did not hold once we controlled for conditions and utilization.

Discussion

We hoped to use study findings to support attempts by DHCT and similar programs to obtain financial support

a Due to a large number of $0 value data in our dependent variables (charges and reimbursements, respectively), we ran 0 inflated negative binominal models on each of the models. No significantly different patterns of results were found, although magnitudes were different. For these results, please contact the authors.

TABLE 1.
Sample Characteristics

Characteristic N (%)	Control (n = 366)	Treatment (n = 119)
Sex		
Female	123 (33.6)	30 (25.2)
Male	243 (66.4)	89 (74.8)
Mean age in years at referral	50.0 (11.3)	50.9 (9.7)
Race/Ethnicity		
Non-Hispanic Black	221 (60.4)	82 (68.9)
Non-Hispanic White	110 (30.0)	36 (30.2)
Other/Missing	35 (9.6)	*
Insurance Status at referral		
Private	11 (3.0)	*
Public	142 (38.8)	58 (48.7)
Uninsured	144 (39.3)	28 (23.5)
Mixed	69 (18.8)	32 (26.9)
Medical Conditions[a]		
Pulmonary Circulation Disorders	39 (10.7)	22 (18.5)
Chronic Pulmonary Disease	132 (36.1)	56 (47.1)
Diabetes	123 (33.6)	58 (48.7)
Hypertension	240 (65.6)	92 (77.3)
Substance use disorder	240 (65.6)	90 (75.6)
Mean conditions count	5.1 (2.7)	6.0 (2.6)
Mean Financial Indicators		
Charges 12 months prior	$62,667 (110,273)	$60,642 (125,663)
Charges 12 months after	$45,997 (84,108)	$28,522 (37,615)
Reimbursements 12 months prior	$7897 (19,240)	$7336 (14,591)
Reimbursements 12 months after	$11,280 (23,030)	$16,358 (33,693)

*N's suppressed due to low count
[a]Conditions were categorized using the Elixhauser Comorbidities Index

beyond that provided by foundations and philanthropic entities. We were unable to find a statistically significant reduction in charges or reimbursement for care; however, the direction of the effect indicates 1) provision of program services of value to patients, and 2) reduction in downstream health care utilization. The majority of the study population was insurance-insecure; most participants were Medicaid eligible but varied in their ability to obtain or keep coverage due to their life circumstances (i.e., childless adults cannot generally qualify for Medicaid in North Carolina). The directional reduction of charges indicates that when housing-insecure patients are able to recover in a safe alternative setting, the offset of the "charitable care" cost can be utilized for proactive programmatic investment like transitional care and medical respite.

Because North Carolina remains a Medicaid non-expansion state, we recommend analyzing state observational studies of similar populations and programs in order to build a business case for investment in transitional care and medical respite services for PEH based on the most effective screening and resourcing capabilities. A state-funded demonstration project currently underway elsewhere may further illuminate how investment in housing security, transitional care and medical respite, and transportation assistance for PEH can inform potential program scalability by region using Medicaid managed care to obtain funding.

Several issues should be highlighted regarding salient policy questions, including the 1) limited consensus regarding the degree of benefit required to justify health care system investment in social interventions, 2) lack of a well-defined standard of comparison for cost-benefit analyses, and c) challenges inherent in collecting data that encompass the far-reaching impact of community-embedded programs such as DHCT.

First, there should be consensus on the standard of evidence required to determine that social interventions deserve investment by health care system organizations. The Center for Medicare and Medicaid Innovation (CMMI) standard for scaling demonstrations requires holding quality constant while reducing costs or increasing quality without

increasing costs [21]. This standard is challenging for any social intervention to achieve at scale.

Moreover, the expectation of saving money in addition to providing benefit that is commonly applied to programs such as DHCT is uncommon among medical interventions aside from hospice and palliative care. It is indeed unusual for any intervention to provide benefits while reducing costs, although such outcomes are not impossible. A new chemotherapy agent with the directional evidence of effect found for DHCT in our study would immediately go to market, and yet the stringent requirements for both efficacy and cost savings currently applied to programs like DHCT could potentially hinder the uptake of efforts to address housing instability.

Even if clarity regarding cost-effectiveness or cost saving is determined to be the best standard by the policymakers who distribute public money, consideration of cost impact leads to the question of, "as compared to what?" Put another way, the beneficiaries of cost savings (e.g., providers, patients and family members, public programs) are not well-defined, and sufficient data often do not exist to undertake a comprehensive evaluation of relevant perspectives. Attempts have been made to operationalize these benefits through a social-return-on-investment model [22], but often whatever data have been available to address cost are defined in an amorphous sense.

It is difficult to ascertain how much information is sufficient to assess interventions that can seldom be subjected to randomized controlled trials (RCTs). The North Carolina Healthy Opportunities Pilots will generate evidence about relationships between social determinants of health, health care utilization, and morbidity that will hopefully show how small social service investments can impact community health for those who are most vulnerable and in need of support. The health system is only 1 key player but it is a big part of the state budget and revenue sourcing. Regardless, there needs to be more funding per capita to provide key services that promote survival and community health. Ultimately, clarity of policy goals and intent is needed to inform evaluation of programs like DHCT.

TABLE 2.
Ordinary Least Squares (OLS) Models for Charges

	Model 1			Model 2			Model 3		
Parameter	**b**	**SE**	**t**	**b**	**SE**	**t**	**b**	**SE**	**t**
Intercept	41512	36565	1.14	14287	39543	0.36	8917	40126	0.22
Pre-Charges	0.23	0.04	5.35[a]	0.16	0.05	3.37[b]	0.16	0.06	2.78[b]
Demographics									
Black	13737	30346	0.45	24745	30250	0.82	29635	30659	0.97
Hispanic	-11928	34928	-0.34	1147	34649	0.03	8592	34982	0.25
White	12747	31070	0.41	22850	30870	0.74	30329	31199	0.97
Male	-4141	10457	-0.40	-4240	10435	-0.41	-3162	10490	-0.30
Age	-462	513	-0.90	-607	525	-1.16	-785	527	-1.49
Deceased	30941	16756	1.85t	29553	16796	1.76t	23761	16937	1.40
Conditions									
Pulm. Circ. Disorders				1225	14087	0.09	1753	14104	0.12
Chronic Pulm. Disease				13536	10684	12.27	11219	10638	1.05
Diabetes				4435	11256	0.39	5086	11249	0.45
Hypertension				-11194	13328	-0.84	-9439	13317	-0.71
Substance Use Disorder				-17501	14044	-1.25	-17218	14091	-1.22
Condition count				6621	3213	2.06[d]	6945	3237	2.15[b]
Health Care Utilization									
ED visits							894	656	1.36
Inpatient							-3702	4047	-0.91
Observation							-2289	2822	-0.81
Office Visits							1627	761	2.14[d]
Intervention									
DHCT	-16207	10677	-1.52	-19139	10783	-1.77[c]	-23069	11092	-2.08[d]
R^2		0.18			0.24			0.27	

Note: Estimates and SEs are shown as whole numbers.
[a] = < .001
[b] = < .01
[c] = *P* < .1
[d] = < .05

TABLE 3.
Ordinary Least Squares (OLS) Models for Reimbursements

	Model 1			Model 2			Model 3		
Parameter	**b**	**SE**	**t**	**b**	**SE**	**t**	**b**	**SE**	**t**
Intercept	10906	8471	1.29	-324	8389	-0.04	-1907	7584	-0.25
Pre Reimbursement	0.66	0.06	11.10[a]	0.46	0.06	7.52[a]	0.38	0.06	6.71[a]
Demographics									
Black	-4494	6901	-0.65	-1999	6522	-0.31	-471	5896	-0.08
Hispanic	-2306	7617	-0.30	1095	7233	0.15	795	6552	0.12
White	-4324	6995	-0.62	-1839	6610	-0.28	-1702	5972	-0.29
Male	7.5	2367	0.31	3361	2298	1.46	3489	2077	1.68[b]
Age	-28	101	-0.28	-62	101	-0.62	-8	91	-0.08
Deceased	6102	3626	1.68t	-44	3507	-0.01	2956	3208	0.92
Conditions									
Pulm. Circ. Disorders				-2704	3332	-0.81	-1876	3020	-0.62
Chronic Pulm. Disease				-3505	2414	-1.45	-3698	2187	-1.69[b]
Diabetes				-7228	2493	-2.90[c]	-4643	2276	-2.04[d]
Hypertension				-7786	2623	-2.97[c]	-7844	2371	-3.31[c]
Substance Use Disorder				-10289	2713	-3.79[c]	-9163	2459	-3.73[c]
Condition count				5209	681	7.64[a]	3752	642	5.85[a]
Health Care Utilization									
ED visits							217	172	1.26
Inpatient							5553	874	6.36[a]
Observation							3793	593	6.40[a]
Office Visits							-4.94	160	-0.03
Intervention									
DHCT	5110	2525	2.02[d]	3801	2420	1.57	805	2301	0.35
R^2		0.23			0.32			0.45	

Note: Estimates and SEs are shown as whole numbers.
[a] = < .001
[b] = *P* < .1
[c] = < .01
[d] = < .05

Limitations

Cost-effectiveness studies are often limited by the ability to obtain charges and reimbursements across encounter types because many commercial rates are proprietary and not open to research and publishing. Data are available for evaluating internal hospital operations, but there is a dearth of data available for cost-effectiveness research. Many studies use cost proxies as "savings," but these savings estimates are often not adequate to allow health system executives involved in the pro-forma accounting of programs to justify resources. This study attempted to use aggregate 6-month intervals of charges and reimbursements, without line-item detail and payer mix, to appropriately compare program participants and a cohort that was screened eligible for the program but did not take part in the intervention.

Conclusion

Studies of programs like DHCT can contribute to building support for appropriate resources to offset uninsured care provision and justify investment to health system, hospital, and physician leadership. In Spring 2022, when North Carolina launched its Medicaid-based Healthy Opportunity Pilots program across 3 regions in the state, an important evaluation of support services related to housing, food, transportation, and interpersonal safety services began, providing a body of evidence to inform the incorporation of an added social support health benefit beyond the traditional charity-care write-off. Funding relies on acknowledging and correctly identifying program benefits, which should be compared to costs in order to assess the public policy merits of moving forward with efforts that have the potential to disrupt a spiral of human pain and suffering that can be resolved with appropriate interventions. NCMJ

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References

1. Fazel S, Geddes JR, Kushel M. The health of homeless people in high-income countries: descriptive epidemiology, health consequences, and clinical and policy recommendations. *The Lancet.* 2014;384(9953):1529–1540. doi:10.1016/S0140-6736(14)61132-6
2. Aldridge RW, Story A, Hwang SW, et al. Morbidity and mortality in homeless individuals, prisoners, sex workers, and individuals with substance use disorders in high-income countries: a systematic review and meta-analysis. *The Lancet.* 2018;391(10117):241–250. doi:10.1016/S0140-6736(17)31869-X
3. Salhi BA, White MH, Pitts SR, Wright DW. Homelessness and emergency medicine: a review of the literature. In: Mitchell AM, ed. *Acad Emerg Med.* 2018;25(5):577–593. doi:10.1111/acem.13358
4. Wadhera RK, Choi E, Shen C, Yeh RW, Joynt Maddox KE. Trends, causes, and outcomes of hospitalizations for homeless individuals: a retrospective cohort study. *Med Care.* 2019;57(1):21–27. doi:10.1097/MLR.0000000000001015
5. Feigal J, Park B, Bramante C, Nordgaard C, Menk J, Song J. Homelessness and discharge delays from an urban safety net hospital. *Public Health.* 2014;128(11):1033–1035. doi:10.1016/j.puhe.2014.06.001
6. Vickery KD, Winkelman TNA, Ford BR, et al. Trends in trimorbidity among adults experiencing homelessness in Minnesota, 2000–2018. *Med Care.* 2021;59:S220. doi:10.1097/MLR.0000000000001435
7. Titan A, Graham L, Rosen A, et al. Homeless status, postdischarge health care utilization, and readmission after surgery. *Med Care.* 2018;56(6):460–469. doi:10.1097/MLR.0000000000000915
8. Khatana SAM, Wadhera RK, Choi E, et al. Association of homelessness with hospital readmissions—an analysis of three large states. *J Gen Intern Med.* 2020;35(9):2576–2583. doi:10.1007/s11606-020-05946-4
9. Racine MW, Munson D, Gaeta JM, Baggett TP. Thirty-day hospital readmission among homeless individuals with Medicaid in Massachusetts. *Med Care.* 2020;58(1):27–32. doi:10.1097/MLR.0000000000001234
10. National Health Care for the Homeless Council. Medical Respite Directory. National Health Care for the Homeless Council website. Published 2021. Accessed July 26, 2021. https://nhchc.org/clinical-practice/medical-respite-care/medical-respite-directory/
11. Biederman DJ, Gamble J, Wilson S, Douglas C, Feigal J. Health care utilization following a homeless medical respite pilot program. *Public Health Nurs.* 2019;36(3):296–302. doi:10.1111/phn.12589
12. Beieler AM, Beieler AM, Dellit TH, et al. Successful implementation of outpatient parenteral antimicrobial therapy at a medical respite facility for homeless patients. *J Hosp Med.* 2016;11(8). doi:10.1002/jhm.2597
13. Lawson LV, Bowie B, Neufeld M. Program evaluation of a recuperative care pilot project. *Public Health Nurs Boston Mass.* 2021;38(1):93–97. doi:10.1111/phn.12834
14. Basu A, Kee R, Buchanan D, Sadowski LS. Comparative cost analysis of housing and case management program for chronically ill homeless adults compared to usual care. *Health Serv Res.* 2012;47(1 Pt 2):523–543. doi:10.1111/j.1475-6773.2011.01350.x
15. Bring C, Kruse M, Ankarfeldt MZ, et al. Post-hospital medical respite care for homeless people in Denmark: a randomized controlled trial and cost-utility analysis. *BMC Health Serv Res.* 2020;20(1):508. doi:10.1186/s12913-020-05358-4
16. Shetler D, Shepard DS. Medical respite for people experiencing homelessness: financial impacts with alternative levels of Medicaid coverage. *J Health Care Poor Underserved.* 2018;29(2):801–813. doi:10.1353/hpu.2018.0059
17. Biederman DJ, Sloane R, Gamble J, Sverchek C, Daaleman TP. Program outcomes and health care utilization of people experiencing homelessness and substance use disorder after transitional care program engagement. Preprint. *J Health Care Poor Underserved.* 2022;33(3):1337–1352. https://preprint.press.jhu.edu/sites/default/files/BiedermanFinalCEPPR.pdf
18. Elixhauser A, Steiner C, Harris DR, et al. Comorbidity measures for use with administrative data. *Med Care.* 1998;36(1):8–27. doi:10.1097/00005650-199801000-00004
19. Quan H, Sundararajan V, Halfon P, et al. Coding algorithms for defining comorbidities in ICD-9-CM and ICD-10 administrative data. *Med Care.* 2005;43(11):1130–1139. doi: 10.1097/01.mlr.0000182534.19832.83
20. Austin SR, Wong Y-N, Uzzo RG, et al. Why summary comorbidity measures such as the Charlson Comorbidity Index and Elixhauser score work. *Med Care.* 2015;53(9):e65–e72. doi:10.1097/MLR.0b013e318297429c
21. Centers for Medicare & Medicaid Services. CCMI Model Certifications. CMS website. Accessed October 29, 2021. https://www.cms.gov/Research-Statistics-Data-and-Systems/Research/ActuarialStudies/CMMI-Model-Certifications
22. Drabo, Emmanuel Fulgence, et al. A social-return-on-investment analysis of Bon Secours Hospital's 'Housing For Health' affordable housing program. *Health Affairs.* 2021:40(3):513–520.