

Long-Term Effects of Housing First for Homeless People with Mental Illness on Costs and Housing Stability



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Introduction

In Canada, there are estimated to be minimally 35,000 individuals experiencing homelessness on any given night.¹ Housing First (HF), an intervention which provides immediate access to permanent housing and individualized support services, has proven to be an effective program to respond to chronic homelessness.^{2,3} Various studies have shown that HF is more effective than alternative treatments at achieving housing stability. The limited information on HF's cost-effectiveness suggests that HF leads to cost offsets, but does not pay for itself.⁴ However, all previous economic studies of HF have been restricted to a follow-up time of two years or less, thus limiting assessments of long-term costs and effects. In response, this research focused on developing a simulation model to project HF's effects on costs, and estimate cost-effectiveness using housing stability as the outcome measure, over a ten-year horizon.

Objectives

- To investigate the long-term costs, from the societal perspective, and effectiveness, in terms of days of stable housing, of Housing First for individuals with mental illness, compared with treatment as usual.
- To assess how baseline participant characteristics alter cost-effectiveness

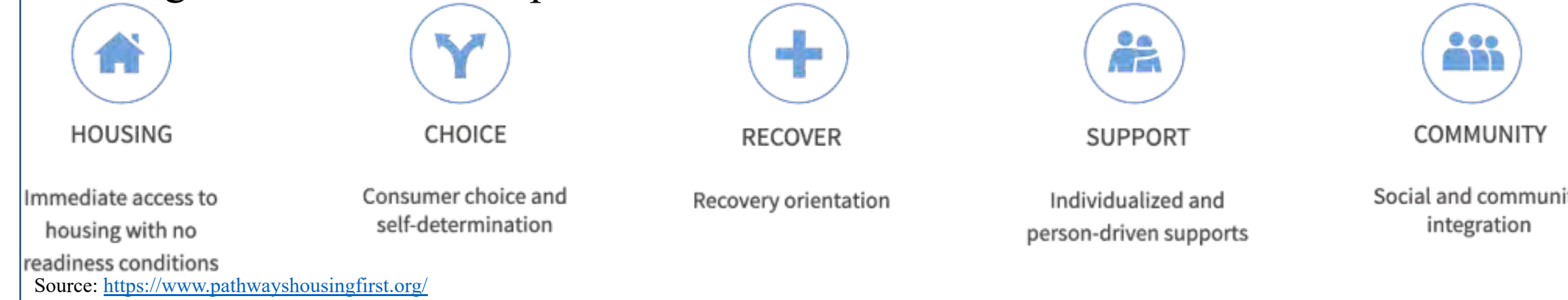
Methods

At Home/Chez Soi interventions:

Individuals participating in the At Home/Chez Soi trial were randomized to either HF or treatment as usual (TAU).

- HF: quickly assisted in finding and keeping housing, a rent subsidy so participants only had to pay 25% of their income on rent (30% if heat was included in rent), and either intensive case management (ICM) if the participant was classified as having moderate needs (MN) or Assertive Community Treatment (ACT) if the participant was classified as having high needs (HN).
- TAU: received services that would normally have been available in their community

Housing First's Core Principles



Data Source:

- Daily transition probabilities from the Montreal At Home/Chez Soi dataset
- Frequency of service use from the Montreal At Home/Chez Soi dataset
- Unit costs for type of place people were staying and service use unit costs were derived from a previous study⁵
- The economic analysis was carried out from a societal perspective, modified to include disability benefits and social assistance costs and inflated to 2019 Canadian dollars
- Death rate from At Home/Chez Soi Toronto extension study and the 2018 age-stratified general Canadian death rate^{6,7}

Model:

- Cohort Markov model coded in Excel using a Discretely Integrated Condition Event (DICE) platform and run for 10 years⁸
- 8 distinct cohorts of individuals based on need level of care required (high or moderate), history of homelessness (less than 2 years or 2 or more years), and treatment group assignment (TAU or HF)
- Individuals transitioned daily through 10 housing states (e.g. street, emergency, or permanent housing) each with a corresponding residential and health, social, and justice costs net of income earned
- Base case analysis was performed using 2.5% "autonomization rate" (the proportion of participants who no longer need ACT or ICM services each successive year after two years), 3% discount rate, and a probability of death derived from the Toronto extension study paired with the age-stratified death rate of the general Canadian population scaled to reflect health vulnerabilities of an individual experiencing homelessness (+15 years to the baseline age)⁹
- One-way sensitivity analyses were performed on the death rate (95% CI for the Toronto death rate & +10 years vs. +20 years general death rate), the discount rate (0 & 3%), and the autonomization rate (0 & 5%)

Abstract

Background and objectives. Homelessness has been expanding in Canada and internationally. It significantly increases mortality and thus is a public health concern. Housing First (HF), an approach that involves providing immediate access to permanent housing and individualized support services, is a key component of strategies to end homelessness. The objective of this project was to develop a simulation model to project HF's effects on costs, from a societal perspective, and housing stability, over a 10-year horizon.

Approach. A novel Excel-based platform, discretely integrated condition event (DICE), was used to build a Markov simulation model. Cost and outcome data were drawn from the Montreal At Home/Chez Soi randomized controlled trial. Based on need level, homelessness history, and intervention group, individuals were divided into eight subgroups. Ten possible housing states such as street, shelters, psychiatric hospitalization, and prison, were defined. Daily transition probabilities between states were calculated by subgroup. Costs of healthcare, social and justice services, and income were calculated for each housing state using generalized least squares regression. Days in stable housing was used as the outcome measure.

Results. Of the 469 individuals randomized, 425 (257 in the HF group and 168 in the TAU group) provided usable data. Preliminary results indicate that HF is both cost-saving and more effective than treatment as usual (TAU). Over ten years, HF participants averaged an additional 1,502 days in stable housing compared to TAU. The incremental cost-effectiveness ratio was negative, indicating that the intervention was cost-saving. Individuals who had a longer history of homelessness and higher need level had the largest cost savings. Savings stemmed from individuals in HF transitioning and staying in HF apartments at a higher rate than TAU participants. TAU groups tended to spend more time in expensive forms of unstable housing such as emergency housing and substance abuse treatment. Sensitivity analysis demonstrate results are robust.

Conclusion. This model illustrates the differences in effectiveness of HF based on clients' needs level and homelessness history. Overall findings suggest that HF dominates TAU in the long-term. Based on these results, expanding HF programs appears to be merited from an economic standpoint.

Results

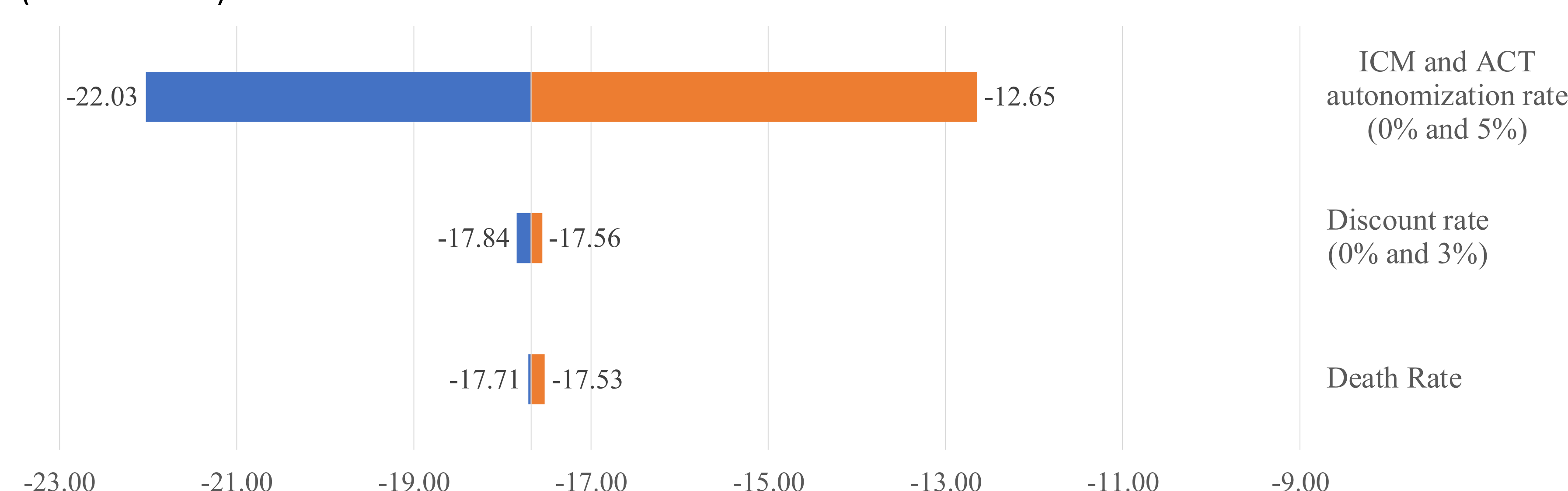
Baseline Demographics

Cohort	MN & homeless < 2 years		HN & homeless < 2 years		MN & homeless ≥ 2 years		HN & homeless ≥ 2 years	
	HF	TAU	HF	TAU	HF	TAU	HF	TAU
No. in treatment group	98 (38%)	38 (23%)	21 (8%)	34 (20%)	85 (33%)	55 (33%)	53 (21%)	41 (24%)
Average age (years)	45.61 (11.3)	46.76 (9.2)	37.32 (10.9)	39.38 (10.8)	46.92 (8.8)	45.52 (9.5)	40.93 (10.8)	42.57 (10.3)
Country of Birth								
Other	17 (17.3%)	2 (5.3%)	3 (14.3%)	3 (8.8%)	5 (5.9%)	10 (18.2%)	12 (22.6%)	11 (26.8%)
Canada	81 (82.7%)	36 (94.7%)	18 (85.7%)	31 (91.2%)	80 (94.1%)	45 (81.8%)	41 (77.4%)	30 (73.2%)
Gender								
Female	62 (63.3%)	32 (84.2%)	21 (100%)	33 (97.1%)	64 (75.3%)	36 (65.5%)	40 (75.5)	35 (85.4%)
Male	0	0	0	0	0	1 (1.8%)	1 (1.9%)	0
Substance use and dependence								
Yes	57 (58.2%)	25 (65.8%)	17 (81.0%)	25 (73.5%)	48 (56.5%)	32 (58.2)	38 (71.7)	28 (68.3%)
No	39 (39.8)	13 (34.2%)	4 (19.0%)	8 (23.5%)	35 (41.2%)	22 (40.0%)	15 (28.3)	12 (29.3%)

Cost-Effectiveness

Cohort	Average 10 year cost per person	Average days in stable housing over 10 years per person	ICER
MN & homeless < 2 years	HF	\$504,207	25340
	TAU	\$507,157	1038
HN & homeless < 2 years	HF	\$705,456	2503
	TAU	\$649,318	961
MN & homeless > 2 years	HF	\$503,512	2432
	TAU	\$476,521	827
HN & homeless > 2 years	HF	\$736,030	1761
	TAU	\$789,492	564
All	HF	\$568,229	2340
	TAU	\$594,801.55	837.87

Sensitivity Analysis (entire cohort)



Conclusion

- Results suggest that a portion of the cohort will remain homeless over a 10-year horizon even with HF; however, HF remains effective at achieving stable housing for a higher proportion of individuals.
- HF appears more cost-effective in the long term than in the short term^{4,10}
- This model highlights how cost-effectiveness varies by subgroup suggesting baseline demographic differences influenced cost-effectiveness.
- Cost savings stem from TAU cohorts transitioning into higher cost housing (such as substance abuse treatment facilities or emergency housing) at a higher rate than HF individuals

This research takes a step towards bridging the knowledge gap between short-term and long-term cost-effectiveness of Housing First. Even among cohorts where cost-effectiveness was lowest, the cost per additional night of stable housing remained lower than the cost of a night in a shelter. Results strengthen the economic argument for providing HF to all adults experiencing chronic homelessness with severe mental illness.

References

- Gaetz S, DeJ E, Richter T, Redman M. *The State of Homelessness in Canada 2016*; 1980. www.homelesshub.ca. Accessed November 28, 2018.
- Aubry T, Nelson G, Tsemberis S. Housing First for People with Severe Mental Illness Who are Homeless: A Review of the Research and Findings from the at Home—Chez soi Demonstration Project. *Can J Psychiatry*. 2015;60(11):467-474. doi:10.1177/070674371506001102
- Tsemberis S. *Housing First: The Pathways Model to End Homelessness for People with Mental Health and Substance Use Disorders*. Minneapolis, United States: Hazelden Publishing; 2015.
- Latimer EA, Rabouin D, Cao Z, et al. Cost-effectiveness of Housing First Intervention With Intensive Case Management Compared With Treatment as Usual for Homeless Adults With Mental Illness: Secondary Analysis of a Randomized Clinical Trial. *JAMA Netw open*. 2019;2(8):e199782. doi:10.1001/jamanetworkopen.2019.9782
- Latimer EA, Rabouin D, Cao Z, et al. Costs of services for homeless people with mental illness in 5 Canadian cities: a large prospective follow-up study. *Can Med Assoc J Open*. 2017;5(3):E576-E585. doi:10.9778/cmajo.20170018
- Stergiopoulos V, Mejia-Lancheros C, Nisenbaum R, et al. Long-term effects of rent supplements and mental health support services on housing and health outcomes of homeless adults with mental illness: extension study of the At Home/Chez Soi randomised controlled trial. *The Lancet Psychiatry*. 2019;6(11):915-925. doi:10.1016/S2215-0366(19)30371-2
- Statistics Canada. Deaths and mortality rates, by age group. doi:10.25318/1310071001-ENG
- Caro JJ. Discretely Integrated Condition Event (DICE) Simulation for Pharmacoeconomics. *Pharmacoeconomics*. 2016;34(7):665-672. doi:10.1007/s40273-016-0394-z
- Culhane D, Treglia D, Steif K, Kuhn R, Byrne T. *Estimated Emergency and Observational/Quarantine Capacity Need for the US Homeless Population Related to COVID-19 Exposure by County; Projected Hospitalizations, Intensive Care Units and Mortality*; 2020. https://works.bepress.com/dennis_culhane/237/. Accessed April 16, 2020.
- Latimer EA, Rabouin D, Cao Z, Ly A, Powell G, Aubry T, Distasio J, Hwang SW, Somers JM, Bayoumi AM, Mitton C, Moodie EEM, Goering PN. "Cost-effectiveness of Housing First with Assertive Community Treatment: Results from the Canadian At Home/Chez Soi trial", *Psychiatric Services*, accepted March 19 2020.

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