

Association of Homelessness with COVID-19 Positivity among Individuals Visiting a Testing Centre: A Cross-Sectional Study

Lien entre itinérance et positivité à la COVID-19
chez les personnes visitant un centre de dépistage :
une étude transversale



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Abstract

Among those visiting a testing centre in Toronto, ON, between March and April 2020, people experiencing homelessness ($n = 214$) were more likely to test positive for COVID-19 compared with those not experiencing homelessness ($n = 1,836$) even after adjustment for age, sex and medical co-morbidity (15.4% vs. 6.7%, $p < 0.001$; odds ratio [OR] 2.41, 95% confidence interval [CI: 1.51, 3.76], $p < 0.001$).

Résumé

Parmi ceux qui ont visité un centre de dépistage à Toronto, en Ontario, entre mars et avril 2020, les personnes en situation d'itinérance ($n = 214$) étaient plus susceptibles d'être testées positives à la COVID-19 que celles qui ne sont pas en situation d'itinérance ($n = 1\ 836$), même après ajustement selon l'âge, le sexe et la comorbidité (15,4 % c. 6,7 %, $p < 0,001$; rapport des cotes [RC] 2,41, intervalle de confiance à 95 % [IC : 1,51, 3,76], $p < 0,001$).

Introduction

In any given year, more than 235,000 people in Canada experience homelessness (Gaetz et al. 2016). People experiencing homelessness are thought to be at a higher risk of acquiring COVID-19 as lack of safe housing makes it difficult to practise physical distancing, hand hygiene and other preventive measures (Perri et al. 2020). Shelter residents are particularly at risk, given congregation in an enclosed space. People experiencing homelessness also have higher rates of chronic conditions, making them more vulnerable to COVID-19 complications (Fazel et al. 2014).

Early in the pandemic, some regions began conducting mobile outreach testing in shelters and detected high rates of infection among asymptomatic residents, especially when there was a known positive case in the shelter (Baggett et al. 2020; Mosites et al. 2020). However, it is unclear how often people experiencing homelessness were visiting testing centres and how their test positivity rates differed from that of others visiting the same centre.

The St. Michael's Hospital COVID-19 Assessment Centre (CAC) was one of 116 testing centres that were opened in Ontario shortly after the pandemic began. It is located in Toronto's urban core where a large proportion of the city's homeless population resides. An

estimated 8,715 of Toronto's 2.9 million residents experienced homelessness on a given night in 2018 and approximately 80% live in the city's 75 shelters (City of Toronto 2018). This study examines the association between homelessness and test positivity among people seen at the CAC.

Method

We conducted a retrospective chart audit of all patients tested for COVID-19 at the St. Michael's Hospital CAC from its opening on March 16, 2020, until April 30, 2020. Testing was free for all individuals regardless of whether they presented a provincial health insurance card. Testing criteria changed according to provincial government direction (Ministry of Health and Long-Term Care 2022) and was largely limited to symptomatic people who were at high risk of acquiring COVID-19 due to vulnerable residence, occupation or high-risk exposure (Ministry of Health and Ministry of Long-Term Care 2022). Vulnerable residence included those unhoused or in homeless shelters. In mid-April, asymptomatic individuals began being tested in specific circumstances (e.g., local outbreak, clinical exposure). We did not include results from the CAC's outreach testing done at shelters that we have reported on separately (Kiran et al. 2021).

Age, sex and health insurance number (if available) were collected at the time of registration. Other data were collected on a standardized form by registered nurses, nurse practitioners or physicians in the CAC. The form included data on symptoms, medical co-morbidities and vulnerable residence based on patients' self-report. We classified people as homeless if the checkboxes for "shelter" or "unhoused" were marked in the CAC chart or if the hospital registration address field contained "no fixed address" or the name or address of a shelter; we manually cross-referenced the address field with a list of shelter addresses in Toronto that we compiled based on publicly available information. Testing results were abstracted from an electronic spreadsheet kept by the CAC. Patients who had more than one test during the study period were categorized as testing positive if any of their results came back positive; we used the data collection form associated with the positive test. Three patients were excluded because their test result was reported as "cancelled," "leaked" or "unavailable."

We used a Chi-squared test or Mann-Whitney test to compare demographics, medical co-morbidities, symptoms and test positivity between people who did and did not experience homelessness. We performed a logistic regression analysis to estimate the odds of testing positive for COVID-19 for people who were and were not homeless after adjustment for age, sex and medical co-morbidity. We used Microsoft Access to collect chart audit data and R version 4.0 for analyses.

Results

Between March and April 2020, 214 (10.4%) of 2,050 unique individuals who were tested at the St. Michael's Hospital CAC were homeless. People experiencing homelessness were

more likely to be male (75.7% vs. 37.0%, $p < 0.001$) and less likely to have a health insurance card (71.5% vs. 97.6%, $p < 0.001$) (Table 1). There was no statistical difference in mean age, but the age distribution was different ($p < 0.001$), with fewer people experiencing homelessness between ages 25 and 49. There were no statistical differences in reported symptoms but people experiencing homelessness were more likely to have at least one medical co-morbidity (70.3% vs. 53.4%, $p < 0.001$) and abnormal vital sign (38.1% vs. 26.0%, $p < 0.01$) compared with those not experiencing homelessness.

TABLE 1. Comparison of demographic characteristics, symptoms, medical co-morbidity and vital signs between people who did and did not experience homelessness

Characteristics	Homeless (n = 214)	Not homeless (n = 1,836)	All (n = 2,050)	p value
Age, median (IQR)	40.3 (31.0–55.5)	41.7 (32.1–54.0)	41.5 (32.1–54.1)	0.64
Age category				<0.001
0–15	4 (1.9%)	14 (0.8%)	18 (0.9%)	
16–24	23 (10.8%)	90 (4.9%)	113 (5.5%)	
25–49	111 (51.9%)	1,130 (61.6%)	1,241 (60.5%)	
50–64	58 (27.1%)	497 (27.1%)	555 (27.1%)	
65+	18 (8.4%)	105 (5.7%)	123 (6.0%)	
Sex				<0.001
Female	52 (24.3%)	1,155 (63.0%)	1,207 (59.0%)	
Male	162 (75.7%)	678 (37.0%)	840 (41.0%)	
Health insurance card available	153 (71.5%)	1,792 (97.6%)	1,945 (94.9%)	<0.001
Symptoms				
Any symptoms	172 (83.1%)	1,563 (85.8%)	1,735 (85.6%)	0.34
No symptoms	35 (16.9%)	258 (14.2%)	293 (14.5%)	0.85
Cough	100 (48.3%)	892 (49.0%)	992 (48.9%)	0.26
Fever	27 (13.0%)	193 (10.5%)	220 (10.8%)	1.00
Shortness of breath	25 (12.1%)	229 (12.6%)	254 (12.5%)	1.00
Other	91 (44.0%)	827 (45.4%)	918 (45.3%)	
Medical co-morbidity				
Any co-morbidity	135 (70.3%)	911 (53.4%)	1,046 (55.1%)	<0.001
No co-morbidity	57 (29.7%)	796 (46.6%)	853 (44.9%)	
Chronic lung disease	25 (13.0%)	179 (10.5%)	204 (10.7%)	0.85
Diabetes	14 (7.3%)	133 (7.8%)	147 (7.7%)	0.24
Heart disease or stroke	14 (7.3%)	83 (4.9%)	97 (5.1%)	0.76
Immunosuppressed	9 (4.7%)	61 (3.6%)	70 (3.7%)	1.00
Smoker	85 (44.3%)	190 (11.1%)	275 (14.5%)	<0.001
Other	66 (34.4%)	485 (28.4%)	551 (29.0%)	0.39
Any abnormal vital sign*	48 (38.1%)	288 (26.0%)	336 (27.2%)	<0.01

*Abnormal vital sign is defined as heart rate > 110, oxygen saturation < 92% and/or respiratory rate > 24. IQR = interquartile range.

People experiencing homelessness were more likely to test positive for COVID-19 compared with those not experiencing homelessness (15.4% [$n = 33$] vs. 6.7% [$n = 123$], $p < 0.001$). People experiencing homelessness had higher odds for testing positive even after

adjustment for age, sex and the presence of any medical co-morbidity (OR 2.41, 95% CI: [1.51, 3.76], $p < 0.001$) (Table 2).

TABLE 2. Adjusted odds* of people experiencing homelessness testing positive for COVID-19 compared with people not experiencing homelessness

Description	Covariate	OR	p value	Lower 95%	Upper 95%
Homelessness	Homeless vs. not homeless	2.41	<0.001	1.51	3.76
Age	Per increase of one year	1.00	0.73	0.99	1.01
Sex	Male vs. female	1.12	0.52	0.78	1.60
Any medical co-morbidity	Any co-morbidities vs. no co-morbidities	0.99	0.97	0.69	1.43

*Adjusted for age, sex and any medical co-morbidity.

Discussion

In this study of individuals visiting a COVID-19 testing centre early in the pandemic, people experiencing homelessness had more than twice the odds of testing positive than those not experiencing homelessness. The higher positivity was present even when accounting for differences in age, sex and medical co-morbidity. Moreover, people experiencing homelessness comprised approximately 10% of all visits to the testing centre, far above the estimated proportion of people experiencing homelessness in Toronto.

Our findings are consistent with those from other studies. Several studies from the US have confirmed high rates of COVID-19 in shelter settings (Yoon et al. 2021). A study from France found that more than half of individuals living in homeless shelters in a region had seropositivity for SARS-CoV-2, with higher rates among those living in crowded settings (Roederer et al. 2021). A study using administrative data in Ontario found higher rates of testing and test positivity among people experiencing homelessness compared with those who were housed (Richard et al. 2021). Our own study of on-site testing at 20 shelter locations found a 14% positivity rate when there was at least one known COVID-19 case in the shelter and a 2% positivity rate among shelters with no known cases – relatively high proportions given that 90% of those tested were asymptomatic (Kiran et al. 2021).

Our study has strengths and limitations. We analyzed data from a large sample from a region with the highest rates of homelessness in Canada. However, data were from a single testing centre early in the pandemic when testing was largely limited to symptomatic individuals living or working in high-risk settings and when testing criteria and our understanding of COVID-19 transmission was rapidly evolving. As such, our results – including testing and positivity rates among people experiencing homelessness – may not be generalizable to other jurisdictions and subsequent waves of COVID-19. Shelters directed residents with symptoms to get tested, which would have additionally influenced testing and positivity rates (healthcare workers and others in the comparison group may have been similarly compelled). People self-reported being homeless, the gold standard for identification. Some

people may have been reluctant to disclose their status but that would have biased our findings to the null. We did not ask people to distinguish the type of homelessness. For example, the pandemic has seen a growth in people living in makeshift encampments as many people experiencing homelessness perceived these to be safer than shelters. But it is unclear whether infection rates in encampments truly differ from shelter settings and more research is needed to understand this.

Conclusion

Our results confirm that people experiencing homelessness are at high risk of COVID-19. Targeted efforts are needed to reduce transmission rates, particularly in shelters and other congregate settings that have seen numerous outbreaks in Canada and around the globe. We need improved ventilation in shelters, given new understanding that aerosol transmission is responsible for much of the spread of COVID-19 (Greenhalgh et al. 2021). We also need better testing for COVID-19 in shelters, including surge testing when there is a known outbreak (Rogers et al. 2020) and use of rapid antigen testing to screen residents in the absence of an outbreak (Kiran et al. 2021).

Perhaps most important and timely, our results support prioritizing those who are homeless – and staff who work with them – to receive a complete COVID-19 vaccine series in a timely way. Vaccinating people who are homeless poses unique logistical challenges. Vaccination efforts will also need to address distrust of the healthcare system, which is common among people experiencing homelessness due to their past experiences of marginalization, dehumanization and exclusion (Magwood et al. 2019). It is encouraging that some early reports suggest that levels of vaccine hesitancy among people experiencing homelessness are no higher than that of the general population (Longchamps et al. 2021). Nonetheless, focused strategies will be needed to build vaccine confidence among people who are homeless; these efforts should involve individuals and organizations that have established relationships with and have earned the trust of people experiencing homelessness in their community.

The ultimate solution to reducing COVID-19 rates among those who are homeless is to end homelessness itself through the creation of permanent stable housing. Since the time of our study, city governments across Canada – from Toronto to Montreal to Vancouver – have moved thousands of individuals experiencing homelessness into spaces that allow for physical distancing, for example, by converting low occupancy hotels into isolation sites (City of Toronto 2020). This rapid housing of the homeless population is unprecedented and offers a potential path to ending homelessness after the pandemic (Hwang 2020). In the meantime, research is needed to understand models of success and whether these efforts have lowered the rates of COVID-19 infection – and morbidity and mortality more broadly – among people who are unhoused.

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