Barriers to Prescription Medication Adherence Among Homeless and Vulnerably Housed Adults in Three Canadian Cities

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Abstract

Objectives: Medication adherence is an important determinant of successful medical treatment. Marginalized populations, such as homeless and vulnerably housed individuals, may face substantial barriers to medication adherence. The objectives of this study were to determine the prevalence of, reasons for, and factors associated with medication non-adherence among homeless and vulnerably housed individuals. Additionally, we examined the association between medication non-adherence and subsequent emergency department utilization during a one-year follow-up period.

Methods: Data were collected as part of the Health and Housing in Transition study, a prospective cohort study tracking the health and housing status of 595 homeless and 596 vulnerably housed individuals in three Canadian cities. Logistic regression was used to identify factors associated with medication non-adherence. The association between medication non-adherence at baseline and subsequent emergency department utilization was also analyzed using logistic regression.

Results: Among 716 participants who had been prescribed a medication by a doctor, 189 (26%) reported non-adherence. Being ≥ 40 years of age was associated with decreased likelihood of non-adherence (AOR 0.59; 95% CI 0.41 - 0.84), as was having a primary care provider (AOR 0.49; 95% CI 0.34 - 0.71). Having a positive screen on the AUDIT (an indication of harmful or hazardous drinking) was associated with increased likelihood of non-adherence (AOR 1.86; 95% CI 1.31 - 2.63). Common reasons for non-adherence included side effects, cost, and lack of access to a physician. Self-reported non-adherence at baseline was significantly associated with frequent emergency department use (≥ 3 visits) over the one-year follow-up period at the bivariate level (OR 1.55; 95% CI 1.02 - 2.35) but did not retain significance in a multivariate model (AOR 1.49; 95% CI 0.96 - 2.32).

Conclusion: Homeless and vulnerably housed individuals face significant barriers to medication adherence. Health care providers serving this population should be particularly attentive to non-adherence among younger patients and those with harmful or hazardous drinking patterns.

Key words: medication adherence; homelessness; vulnerable populations; urban health

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Background

Medication adherence, or the extent to which patients take prescribed medications, is an important determinant of successful medical treatment.[1,2] One meta-analysis found an average treatment adherence rate of 75.2%, with rates ranging from 4.6% to 100% across studies.[3] Non-adherence to clinically indicated medications can result in high costs to the health care system[1,2] and increase subsequent emergency department visits and hospitalizations.[4-7]

Given the consequences of poor adherence, it is important to determine the prevalence of and reasons for self-reported non-adherence in marginalized populations that already experience poor health outcomes. In Canada, people who reported poorer health, lower incomes, and no prescription drug coverage were significantly more likely to report non-adherence for cost-related reasons.[8] Several Canadian provinces include a premium or deductible in their drug benefit programs,[9] which could result in poor medication adherence and an increase in hospital-based service utilization.[10] For individuals who are homeless or vulnerably housed, additional structural barriers such as lack of privacy, lack of a place to store medications, and lost or stolen medications may reduce adherence.[11] In a study of 966 homeless single adults in the United States, 36% of participants reported an unmet need for prescription medications.[12] A study of 368 homeless adults in Toronto, Canada, found that 32% of respondents were unable to obtain their prescription medications, with 63% of these individuals attributing this to a lack of drug benefits.[13]

This study examines the prevalence of and factors associated with self-reported non-adherence to medications among homeless and vulnerably housed adults in three large Canadian

cities. This study also determines the association between self-reported medication non-adherence and frequent emergency department visits during a one-year follow-up period. An important feature of this study is the inclusion of individuals who are vulnerably housed and at high risk of becoming homeless, a group that has been less well studied than homeless individuals.

Methods

Data were obtained from the Health and Housing in Transition (HHiT) study, a prospective cohort study of homeless and vulnerably housed single adults in Vancouver, Toronto, and Ottawa. The design of the study has been described previously.[14]

Study setting. This study was conducted in the provinces of Ontario and British Columbia, both of which have publicly funded universal health insurance systems that provide coverage for hospital and physician services and drug benefit programs for residents who are receiving welfare or disability benefits.[9] Drug benefit coverage is limited to drugs listed on provincial formularies.[15,16] Additional programs sometimes provide additional coverage for certain individuals whose prescription drug costs are high relative to their income, but these programs include a deductible and co-payments.[16,17]

Participants and recruitment. Between January and December 2009, 1,191 single adults (18 years or older) were enrolled, of whom 595 were homeless and 596 were vulnerably housed. Homelessness was defined as living within the last 7 days at a shelter, public place, abandoned building, vehicle, or someone else's place, and not having one's own place. Recruitment of

homeless adults occurred at shelters and meal programs using sampling methods designed for this population.[18]

Individuals were considered to be vulnerably housed if they were living in their own room or apartment, but had been homeless or had two or more moves in the past 12 months. Vulnerably housed individuals were recruited at rooming houses, single room occupancy hotels, and meal programs. All study participants provided informed consent and were reimbursed $20 CDN for each interview. This study was approved by the Research Ethics Board at St. Michael's Hospital, the University of Ottawa, and the University of British Columbia.

Survey instrument. Data were obtained through 60-90 minute structured in-person interviews conducted at the time of recruitment and at a follow-up interview approximately 12 months later. The survey instrument obtained information on demographic characteristics, housing status, health status and health conditions, quality of life, health care utilization, substance use, and risk behaviors.[19,20] Past or present mental health diagnoses were based on self-report. Eligibility for a drug benefit program was determined on the basis of receiving welfare or disability benefits.

Alcohol abuse was assessed using the Alcohol Use Disorders Identification Test (AUDIT). A positive screen is defined as a score of ≥ 8 and is indicative of hazardous or harmful drinking.[21] Drug abuse and drug-related problems were assessed using the Drug Abuse Screening Test (DAST-10).[22] A positive screen is defined as a score of ≥ 3 and is indicative of moderate, substantial, or severe drug use problems.

The main outcome variable for our analysis was self-reported non-adherence to medication, assessed using the questions "Are you currently supposed to be taking medication that was prescribed by a doctor?" and "Are you actually taking this medication?"[23] Non-

adherence was defined as responding "yes" to the former question and "no" to the latter question. Reasons for non-adherence were identified by asking "If you are NOT taking the medication prescribed to you, why not?" Response options included: the medication is too expensive; difficulties storing medication; unable to take the medication as recommended; disliking side effects; not believing in taking medication; and other reasons. Other reasons were categorized by two independent reviewers.

The second outcome measure used in this analysis was self-reported emergency department visits. Participants were re-interviewed approximately one year after the baseline interview and asked "In the past 12 months, have you gotten health care from a hospital emergency room?" and if so, "How many times in the past 12 months?" Frequent emergency department utilization was defined as ≥ 3 visits in the past year.

Statistical analysis. Chi-square test and Fisher's Exact test were used to compare the characteristics of participants who reported medication non-adherence with those who reported adherence. Logistic regression was used to identify factors associated with medication non-adherence, as well as to evaluate whether there was an association between medication non-adherence at the baseline interview and frequent emergency department use at follow-up.

Multivariate models were constructed using a purposeful selection technique.[24] After generating univariate logistic regression models for each covariate against each outcome of interest, variables that met the inclusion criteria (p≤0.25) were added into a multivariate model. Variables were then removed from the model if they did not meet inclusion criteria for retention (p≤0.10) and removal of the variable did not alter the parameter estimate of any remaining variable by ≥15%. After all parameters were tested iteratively, variables that were not significant

in the univariate models were added back in one at a time to determine if they were significant in the final model. Models were tested for best fit using the Hosmer-Lemeshow test. All analyses were performed using SAS 9.3 software (SAS Institute Inc., Cary, NC, USA).

Results

Of 1,191 study participants, four were excluded because they did not indicate if they were prescribed a medication. A total of 716 (60%) participants reported that they were supposed to be taking a prescribed medication, and 189 (26% of those prescribed a medication) reported that they were not taking the medication. One year follow-up data were available for 970 (82.6%) participants.

Table 1 compares the characteristics of participants who reported medication non-adherence and adherence. Participants reporting non-adherence were significantly more likely to be under 40 years of age, to have been employed in the past 12 months, and to have a higher AUDIT risk level. They were significantly less likely to have a primary care provider.

Table 2 displays the results of the bivariate and multivariate logistic regression models. In the multivariate model, being 40 years of age or older was associated with decreased likelihood of non-adherence (AOR 0.59; 95% CI 0.41 - 0.84), as was having a primary care provider (AOR 0.49; 95% CI 0.34 - 0.71). A positive AUDIT screen was associated with increased likelihood of non-adherence (AOR 1.86; 95% CI 1.31 - 2.63). Table 3 summarizes participants' reasons for not taking a prescribed medication. The most common reasons included medication side effects, the cost of medications, and lack of access to a physician.

Of the 970 participants who were re-interviewed one year after enrollment, 175 (18%) reported ≥ 3 visits to the emergency department during the one-year follow-up period. Self-

reported non-adherence at baseline was associated with frequent visits to the emergency

department at the bivariate level (OR 1.55; 95% CI 1.02 - 2.35). However, this relationship did

not retain statistical significance (AOR 1.49; 95% CI 0.96 - 2.32) in a multivariate model that

included the following variables: housing status, mental health diagnoses, having a positive

AUDIT screen, and being a victim of physical violence in the past 12 months.

Discussion

Of the 716 participants who were prescribed a medication, 26% reported non-adherence. This

rate is almost identical to the average rate of non-adherence in a meta-analysis of studies

conducted in a broad range of patient populations.[3] The level of medication non-adherence in our

study did not vary significantly by housing status. In a multivariate model, only age, positive

AUDIT screen, and access to a primary care provider were significantly associated with

medication non-adherence. This association between non-adherence and younger age is

consistent with other studies, including a seven-country comparison of medicine underuse due to

cost[25] and a U.S. study examining adherence to antiretroviral therapy among homeless or

unstably housed adults living with HIV/AIDS.[26] Clinicians should therefore be particularly alert

to non-adherence among younger adults who are homeless or vulnerably housed. While less than

3% of our non-adherent participants attributed their non-adherence to substance use, a positive

screen for hazardous or harmful drinking was significantly associated with non-adherence,

highlighting the importance of recognizing this factor as contributing to non-adherence.

In our multivariate model, having a primary care provider was associated with a

significantly lower likelihood of non-adherence. This finding likely reflects both better access to

a prescriber and support from a primary care provider that may enable individuals to achieve

higher adherence. Previous studies have shown that patient-centered primary care, collaborative physician-patient interactions, and patient and provider symmetry in health locus of control beliefs are associated with better adherence.[27-29] In contrast, homeless and vulnerably housed individuals who do not have a primary care provider may obtain care in settings such as emergency departments or walk-in clinics that are not structured to encourage long-term medication adherence.

Participants provided a variety of reasons for not taking prescribed medications. Avoiding unpleasant side effects or denying the severity of a health problem are reasons commonly cited in the general population.[1,2] However, other reasons may indicate barriers related to housing status, such as not having regular access to a doctor, lacking a safe place to store medications, or having competing priorities. Previous studies have found that unstable housing and homelessness are associated with antiretroviral medication non-adherence among HIV-infected persons.[30-33]

A statistically significant association between non-adherence and subsequent self-reported frequent emergency department utilization was observed in univariate but not multivariate models. We speculate that this finding may be due to a lack of adequate power rather than the absence of a true association. Future studies should correlate medication adherence among homeless and vulnerably housed individuals with administrative health data, as previous studies have demonstrated a relationship between medication non-adherence and subsequent health care utilization.[4-6]

This study has certain limitations. Medication adherence was measured using self-report. While other methods of assessing adherence have been used in clinical studies, these methods are difficult to apply to large population-based samples. Another limitation was a lack of

information on the specific medications for which participants were adherent or non-adherent.

Data on emergency department visits were also based on self-report. Finally, the generalizability

of our findings to other health care systems is uncertain.

Conclusion

Homeless and vulnerably housed adults face significant barriers to achieving medication

adherence. Some of these barriers may be alleviated by having safe, secure, and stable housing.

Our findings confirm the importance of having a source of regular primary care to enhance

medication adherence. In addition, health care providers should be attuned to the increased risk

of non-adherence among younger homeless and vulnerably housed adults and those with a

positive AUDIT screen.

Competing interests

The authors declare that they have no competing interests.

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Table 1. Characteristics of participants at baseline

Characteristic	All participants prescribed medication (n=716)	Participants reporting non-adherence (n=189)	Participants reporting adherence (n=527)	*P*-value
Age group				
≤39 years	266 (37.15)	90 (47.62)	176 (33.40)	0.001
≥40 years	450 (62.85)	99 (52.38)	351 (66.60)	
Gender, n (%)				
Male	423 (59.08)	115 (60.85)	308 (58.44)	0.85
Female	281 (39.25)	71 (37.57)	210 (39.85)	
Transgender	12 (1.68)	3 (1.59)	9 (1.71)	
Housing status at recruitment, n (%)				
Homeless	335 (46.79)	98 (51.85)	237 (44.97)	0.10
Vulnerably housed	381 (53.21)	91 (48.15)	290 (55.03)	
City, n (%)				
Vancouver	260 (36.31)	61 (32.28)	199 (37.76)	0.20
Toronto	205 (28.63)	52 (27.51)	153 (29.03)	
Ottawa	251 (35.06)	76 (40.21)	175 (33.21)	
Eligible for drug benefit, n (%)	664 (93.92)	170 (91.40)	494 (94.82)	0.09
Number of chronic health conditions, n (%)				
0	48 (6.70)	12 (6.35)	36 (6.83)	0.91
1	109 (15.22)	26 (13.76)	83 (15.75)	
2	108 (15.08)	29 (15.34)	79 (14.99)	
≥3	451 (62.99)	122 (64.55)	329 (62.43)	
Racial/cultural group, n (%)				
White	460 (65.81)	119 (65.38)	341 (65.96)	0.82
Black/African-Canadian	54 (7.73)	13 (7.14)	41 (7.93)	
First Nations/Aboriginal	144 (20.60)	41 (22.53)	103 (19.92)	
Mixed ethnicity and Other	41 (5.87)	9 (4.95)	32 (6.19)	
Monthly income in past 12 months, n (%)				
<$1000	395 (55.17)	95 (50.26)	300 (56.93)	0.11
≥$1000	321 (44.83)	94 (49.74)	227 (43.07)	
Employed in past 12 months, n (%)	245 (34.27)	76 (40.43)	169 (32.07)	0.04
Highest level of education, n (%)				
Some post-secondary education or higher	225 (31.60)	66 (35.11)	159 (30.34)	0.40
Completed high school or equivalent	147 (20.65)	34 (18.09)	113 (21.56)	
Some high school	340 (47.75)	88 (46.81)	252 (48.09)	
Food security, n (%)				

Eats enough	182 (25.49)	48 (25.53)	134 (25.48)	0.07
Sometimes eats enough	69 (9.66)	26 (13.83)	43 (8.17)	
Does not eat enough	463 (64.85)	114 (60.64)	349 (66.35)	
Ever diagnosed with a mental health problem, n (%)	471 (66.62)	124 (67.03)	347 (66.48)	0.89
DAST screen positive, n (%)	417 (58.49)	111 (59.04)	306 (58.29)	0.86
DAST Risk Level				
No drug use in past 12 months	187 (26.23)	44 (23.40)	143 (27.24)	0.50
Low level	109 (15.29)	33 (17.55)	76 (14.48)	
Moderate level	170 (23.84)	48 (25.53)	122 (23.24)	
Substantial level	175 (24.54)	41 (21.81)	134 (25.52)	
Severe level	72 (10.10)	22 (11.70)	50 (9.52)	
AUDIT screen positive, n (%)	267 (37.39)	90 (47.87)	177 (33.65)	0.001
AUDIT Risk Level				
Low risk	447 (62.61)	98 (52.13)	349 (66.35)	0.004
Hazardous level	110 (15.41)	34 (18.09)	76 (14.45)	
Harmful level	38 (5.32)	12 (6.38)	26 (4.94)	
High risk	119 (16.67)	44 (23.40)	75 (14.26)	
Has a primary care provider	528 (73.85)	116 (61.38)	412 (78.33)	<0.001

Table 2. Factors associated with non-adherence among homeless and vulnerably housed participants who were prescribed a medication by a physician

	Bivariate model	Multivariate model
	OR (95% CI)	AOR (95% CI)
Age group		
≤39 years (Ref)	1.00	1.00
≥40 years	0.55 (0.39, 0.77)	0.59 (0.41, 0.84)
Gender		
Female (Ref)	1.00	
Male	1.10 (0.78, 1.56)	
Transgender	0.99 (0.21, 3.41)	
Housing status at recruitment		
Homeless (Ref)	1.00	1.00
Vulnerably housed	0.76 (0.54, 1.06)	0.75 (0.53, 1.06)
City		
Ottawa (Ref)	1.00	
Toronto	0.78 (0.52, 1.18)	
Vancouver	0.71 (0.48, 1.05)	
Eligible for drug benefit	0.58 (0.31, 1.13)	
Number of chronic health conditions		
0 (Ref)	1.00	
1	0.94 (0.43, 2.12)	
2	1.10 (0.51, 2.47)	
≥3	1.11 (0.58, 2.29)	
Racial/cultural group		
White (Ref)	1.00	
Black/African-Canadian	0.91 (0.45, 1.71)	
First Nations/Aboriginal	1.14 (0.75, 1.72)	
Mixed ethnicity or Other	0.81 (0.35, 1.67)	
Monthly income		
< $1000 (Ref)	1.00	
≥ $1000	1.31 (0.94, 1.83)	
Employed in past 12 months	1.44 (1.02, 2.03)	
Highest level of education		
Some post-secondary education or higher	1.00	
Completed high school or equivalent	0.73 (0.45, 1.16)	
Some high school	0.84 (0.58, 1.23)	
Food security		
Eats enough (Ref)	1.00	1.00
Sometimes eats enough	1.69 (0.93, 3.03)	1.69 (0.91, 3.11)
Does not eat enough	0.91 (0.62, 1.36)	0.88 (0.59, 1.33)
Ever diagnosed with a mental health problem	1.03 (0.72, 1.47)	

Positive DAST screen	1.03 (0.74, 1.45)	
DAST Risk Level		
No drug use in past 12 months	0.71 (0.42, 1.21)	
Low level	1.00	
Moderate level	0.91 (0.54, 1.54)	
Substantial level	0.71 (0.41, 1.21)	
Severe level	1.01 (0.53, 1.93)	
Positive AUDIT screen	1.81 (1.29, 2.54)	1.86 (1.31, 2.63)
AUDIT Risk Level		
Low risk	0.61 (0.30, 1.29)	
Hazardous level	0.97 (0.44, 2.20)	
Harmful level	1.00	
High risk	1.27 (0.59, 2.84)	
Has a primary care provider	1.26 (0.90, 1.78)	0.49 (0.34, 0.71)

Table 3. Reasons given for non-adherence to prescribed medications, among 177* participants reporting non-adherence at baseline

Reason	N (%)
Dislike side effects of medications	59 (33.33)
Cost-related reasons (including not having drug coverage)	26 (14.69)
Lack of access to a doctor (e.g., could not obtain refill prescription)	20 (11.30)
Do not believe in taking medications (including "disliking" pills)	16 (9.04)
Do not feel they have a health problem, or condition is asymptomatic	12 (6.78)
Storage issues and medications being stolen	8 (4.52)
Competing priorities (e.g., too busy looking for shelter)	6 (3.39)
Substance abuse (alcohol and/or drugs)	5 (2.82)
Disagreement with health care provider's management plan	5 (2.82)
Not able to take medications as recommended	4 (2.26)
Distrust of/ poor relationship with doctors and other health care providers	3 (1.69)
Forgetfulness	2 (1.13)
Depression or hopelessness	1 (0.56)
Other	24 (13.56)

*Of the 189 participants reporting non-adherence at baseline, 177 provided a reason for not taking prescribed medications. A total of 191 reasons were given, as participants were able to provide multiple reasons.