Barriers to Medication Adherence in Phoenix Homeless Populations

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Abstract

Background: Adherence to medications is a complex issue that has a significant impact on individual patients as well as on the effectiveness and financial burden of the health care system.

Methods: This descriptive retrospective study seeks to answer which, if any, specific barriers exist as obstacles to medication adherence within the Phoenix homeless population. Data was collected via retrospective chart review from the web-based EMR at the interdisciplinary Student Health Outreach for Wellness (SHOW) Clinic. This included health literacy and medication adherence surveys administered by staff during patient triage.

Results: A total of 127 patients ages 20 to 88 were chart reviewed. Only charts having medication adherence questionnaires administered during triage were included. Data was collected from a two year period: July 2015 to July 2017. De-identified patient demographic information such as age, gender, chief complaint, chronic diagnosis, prescription medications, health literacy, and medication adherence were statistically analyzed for significance.

Conclusions: Data demonstrated that chronic conditions with increased symptomatology were more likely to increase medication adherence, whereas variables coinciding with chronic conditions that have extended asymptomatic periods were more likely to decrease medication adherence. Variables relating to psychiatric illness showed an association with more missed doses. Greater number of total prescription medications negatively affected adherence. The most common reason for missing a dose was needing a prescription refill. In regards to health literacy, the highest association with missed doses was with people who were 'somewhat confident,' as opposed to those with lower levels of health literacy.

Introduction

- Medication adherence is the degree to which patients take medications as prescribed.
- The transient lifestyle inherent in homelessness is in and of itself a barrier to medication adherence; however, homelessness also serves to encapsulate additional risk factors for medication non-adherence such as low functional health literacy, psychiatric conditions, and financial hardship which are common burdens in the homeless population.
- Prior research has identified several obstacles to medication adherence such as side effects, cost, stolen medication, lack of social support, and distrust of medical providers though these factors vary widely between populations studied (eg. homeless youth with mental instability vs. homeless mothers).
- Another risk factor consistently demonstrating a link with poor health-related outcomes for medication non-adherence is poor health literacy defined as "the degree to which individuals can obtain, process, and understand basic health information and services needed to make an appropriate health decision."
- Research supports that improving medication adherence leads to a myriad of improved outcomes such as better individual quality of life and decreased costly ED visits & hospital admissions.
- The rationale behind this study is to increase our understanding of the obstacles to adherence which are specific to homelessness.
- We aim to determine the significant risk factors to medication non-adherence so that they may be addressed with future interventions at the SHOW Clinic. As an interdisciplinary clinic, SHOW is effectively poised to integrate models for adherence.

Figure 1. Medication adherence questionnaire

1. How confident are you filling out medical forms by yourself?
   - Very
   - Somewhat
   - Not at all
   - Proxy (someone else is filling this form)
2. Are you currently taking prescription medications?
3. If yes, have you missed any doses in the last two weeks?
4. If yes, have you missed any doses in the past year?
5. If yes to either #3 or #4, what has prevented you from taking your medication?

Methods

- Data was collected via retrospective chart review from the web-based EMR, Practice Fusion, at the interdisciplinary SHOW Clinic.
- Adults >=18 years of age who were administered a medication adherence questionnaire during intake between July 2015 and July 2017 were enrolled in the study.
- Data collected included de-identified patient demographic and medical information: age, gender, chief complaint, chronic diagnosis, prescription medications, total number of medications, daily dosing of medication, and medication adherence and health literacy questionnaire.
- Patient demographic and clinical characteristics between those who did versus those who did not miss medication doses at 2 weeks were assessed using means, standard deviations for continuous variables and frequencies, and proportions for categorical variables.
- Univariate logistic regression was used to ascertain independent predictors between the patient characteristics and the likelihood of missing their medication doses at 2 weeks.
- Those predictors with $p<0.20$ were entered into a second model where a backwards variable selection was implemented and p-values were then calculated via multivariate analysis using logistic regression to ascertain which predictors as a group best predict medication misses at 2 weeks.
- The exact procedure was repeated for medication missed at 1 year.
- All p-values were 2-sided and $p<0.05$ were considered statistically significant. Data analyses were conducted using STATA version 14 (College Station, TX).

Results

- A total of 127 patients ages 20 to 88 were chart reviewed.
- There was no statistical difference between the gender or mean age of those who missed versus those who did not miss a prescription medication dose at two weeks or one year.

Table 1. Doses missed in the past two weeks and one year by chief complaint

Chief complaint (example)	Two weeks OR (95% CI)[1]	P-value[2]	One year OR (95% CI)[1]	P-value[2]
Cardiovascular (chest pain)	1.96 (0.51, 7.60)	0.33	0.96 (0.18, 5.18)	0.96
Dermatologic (wound care)	0.40 (0.16, 1.02)	0.05	0.30 (0.09, 1.03)	0.05
Endocrine (hyperglycemia)	0.81 (0.17, 3.80)	0.79	0.62 (0.10, 3.66)	0.60
Gastrointestinal (abdominal pain)	1.96 (0.50, 7.60)	0.33	1.66 (0.18, 15.1)	0.65
Musculoskeletal (back pain)	0.70 (0.27, 1.75)	0.44	0.80 (0.25, 2.57)	0.71
Neurologic (headache)	1.89 (0.19, 18.6)	0.58	N/A	
Obstetric/gynecologic (vaginosis)	N/A		N/A	
Psychiatric (hallucinations)	1.96 (0.50, 7.60)	0.33	2.8 (0.33, 23.7)	0.34
Pulmonary (URI)	0.93 (0.41, 2.09)	0.87	0.75 (0.25, 2.26)	0.61
Renal/genitourinary (dysuria)	N/A		N/A	
Medication refill	2.38 (0.82, 6.9)	0.11	1.79 (0.46, 6.88)	0.39
Other	0.48 (0.14, 1.67)	0.25	N/A	

[1]OR > 1 means the patient is more likely to miss medications and OR < 1 indicates the patient is less likely to miss medications.
[2]P-values calculated via univariate analysis using logistic regression.

Table 2. Doses missed in the past two weeks and one year by chronic condition

Chronic condition (example)	Two weeks OR (95% CI)[1]	P-value[2]	One year OR (95% CI)[1]	P-value[2]
No chronic diagnosis	0.29 (0.05, 1.67)	0.16	N/A	
Cardiovascular (CHF)	1.33 (0.66, 2.67)	0.42	2.03 (0.75, 5.48)	0.16
Dermatologic (psoriasis)	1.25 (0.11, 14.2)	0.85	N/A	
Endocrine (type II DM)	2.98 (1.04, 8.52)	0.04	2.15 (0.56, 8.2)	0.26
Gastrointestinal (GERD)	0.50 (0.18, 1.41)	0.19	1.96 (0.40, 2.64)	0.40
Infectious Disease (HIV)	0.38 (0.13, 1.09)	0.07	0.46 (0.13, 1.59)	0.22
Musculoskeletal (arthritis)	0.85 (0.34, 2.09)	0.72	2.64 (0.55, 12.7)	0.22
Neurologic (epilepsy)	1.64 (0.48, 5.54)	0.42	0.36 (0.08, 1.49)	0.16
Psychiatric (schizophrenia)	2.05 (1.01, 4.18)	0.04	1.39 (0.52, 3.66)	0.50
Pulmonary (COPD)	0.86 (0.40, 1.84)	0.70	0.57 (0.20, 1.55)	0.27
Renal (CKD)	N/A	0.28	N/A	
Other	0.59 (0.19, 1.79)	0.35	1.55 (0.30, 7.79)	0.59

[1]OR > 1 means the patient is more likely to miss medications and OR < 1 indicates the patient is less likely to miss medications.
[2]P-values calculated via univariate analysis using logistic regression.

Table 3. Doses missed in the past two weeks and one year by prescription medication

Prescription medication (example)	Two weeks OR (95% CI)[1]	P-value[2]	One year OR (95% CI)[1]	P-value[2]
Glucocorticoids	N/A		N/A	
Antihistamines	0.56 (0.31, 1.61)	0.28	1.14 (0.21, 6.0)	0.87
Anticholinergics (benztropine)	0.72 (0.26, 1.99)	0.53	1.33 (0.25, 6.86)	0.73
Benzodiazepines	N/A		N/A	
Non-antipsychotic psychiatric (SSRI)	1.47 (0.58, 3.71)	0.40	10.5 (1.31, 83.4)	0.02
Anti-psychotic (haloperidol)	2.06 (0.75, 5.63)	0.15	1.27 (0.36, 4.41)	0.70
Neurologic (gabapentin)	3.72 (0.78, 17.6)	0.09	3.22 (0.38, 27.2)	0.28
Diabetic (insulin)	4.95 (1.07, 22.8)	0.04	3.65 (0.43, 30.5)	0.23
Gastrointestinal (PPI)	0.43 (0.09, 2.03)	0.28	0.96 (0.09, 9.8)	0.97
Cardiovascular (antihypertensive)	2.15 (0.97, 4.75)	0.05	6.94 (1.48, 32.5)	0.01
Anti-coagulant	0.59, 0.11, 3.05)	0.53	0.30 (0.04, 2.28)	0.24
Pulmonary (inhaler)	0.73 (0.32, 1.69)	0.47	0.75 (0.26, 2.21)	0.61
Statin	0.90 (0.14, 5.63)	0.91	0.31 (0.02, 5.22)	0.41
Narcotic (opiate)	1.59 (0.47, 5.40)	0.45	N/A	
NSAID (ibuprofen)	0.48 (0.18, 1.25)	0.13	0.50 (0.14, 1.75)	0.28
Infectious (antibiotic)	0.70 (0.20, 2.45)	0.58	1.31 (0.13, 12.5)	0.81

Daily dosing	Two weeks OR (95% CI)[1]	P-value[2]	One year OR (95% CI)[1]	P-value[2]
As needed	0.64 (0.27, 1.53)	0.32	0.63 (0.18, 2.20)	0.46
One	1.13 (0.47, 2.69)	0.78	0.87 (0.26, 2.88)	0.82
Two	0.86 (0.30, 2.47)	0.78	1.07 (0.25, 4.5)	0.92
Three	2.44 (0.48, 12.2)	0.27	N/A	
Total number of medications	1.12 (0.97, 1.32)	0.09	1.68 (1.14, 2.49)	0.009

[1]OR > 1 means the patient is more likely to miss medications and OR < 1 indicates the patient is less likely to miss medications.
[2]P-values calculated via univariate analysis using logistic regression.

Multivariate analysis for two weeks

- For patients who had missed doses within the past *two weeks* of the patient encounter, taking antipsychotic prescription medications was best able to predict the likelihood of missing prescription medication doses.
- In contrast, patients with infectious disease, for example chronic conditions such as HIV or TB, were more likely to adhere to prescription medications.

Multivariate analysis for one year

- For patients who had missed doses within the past *one year* of the patient encounter, increased total number of medications and taking prescription cardiovascular medications were best able to predict the likelihood of missing prescription medication doses.
- Dermatological or wound chief complaints were still found to be positively associated with adhering to prescription medications.

Table 4. Reasons for missed doses at two weeks and one year

Reason missed	Two weeks (n, %) N=84	One year (n, %) N=64
Side effects	8 (9.6)	7 (10.9)
Stolen	13 (15.7)	8 (12.5)
Lost	14 (16.9)	7 (10.9)
No storage	7 (8.4)	8 (12.5)
Too expensive	3 (3.6)	4 (6.3)
Forgot	14 (16.9)	11 (17.2)
Need Refill	22 (26.5)	17 (26.6)
Unable to retrieve from pharmacy	6 (7.2)	2 (3.1)
Confusion	7 (8.4)	5 (7.8)
Too many medications	2 (2.4)	2 (3.1)
Asymptomatic / "Don't need it"	3 (3.6)	6 (9.3)
Lack of privacy	2 (2.4)	0 (0.0)

Health Literacy

- Patients with decreased health literacy ('somewhat confident,' 'not confident,' or had the form filled by another person), showed an increase in doses missed in the past *two weeks* compared with patients who were 'very confident.'
- The highest association with missed doses was with people who were 'somewhat confident,' compared with lower levels of health literacy.
- When differing levels of health literacy were analyzed with respect to doses missed in the *past year*, requiring another person to help was protective in terms of missed doses while 'somewhat confident' & 'not confident' both showed an association with missed doses.

Discussion and Conclusions

Factors that increase the likelihood of adherence over baseline

- For patients who had missed doses in the past *two weeks* & in the *past year*, having a dermatologic chief complaint emerged as demonstrating a *positive* effect on medication adherence on both the univariate & multivariate analyses.
- One hypothesis for this is skin issues will be visual and readily apparent to the patient thereby encouraging compliance with therapy to resolve symptoms.
- Though not statistically significant, this trend appears to hold true for other chronic conditions with increased symptomatology: for example, gastrointestinal conditions such as GERD, musculoskeletal conditions such as chronic back pain or arthritis, and pulmonary conditions such as COPD.
- Chronic infectious disease emerged on multivariate analysis as a clinically relevant factor for improved medication adherence. One possible explanation for this trend is that many of these patients may be receiving additional support through specialty clinics above and beyond the primary care setting.

Factors that decrease the likelihood of adherence over baseline

- For patients who had missed doses in the past *two weeks* from the time of the patient encounter, endocrine chronic conditions, type one and two diabetes mellitus prescription medications, and cardiovascular prescription medications demonstrated a *negative* effect on medication adherence.
- In contrast to symptomatic conditions improving medication adherence, it appears that the opposite trend may also hold true: chronic conditions with extended asymptomatic periods—eg. hypertension, type two diabetes, epilepsy—may increase a patients' likelihood of non-adherence.
- Psychiatric chronic conditions also emerged as having a negative effect on medication adherence in the past *two weeks*. Additionally, psychiatric chief complaints for two week and one year prescription medication adherence, psychiatric chronic conditions for one year adherence, and anti-psychotic prescription medications for two week and one year adherence all demonstrate an increased effect on missed doses, though these were not statistically significant. Non-antipsychotic psychiatric prescription medications such as SSRIs and mood stabilizers also had a pronounced and statistically significant adverse effect on adherence in the past *year*.
- Because of the innate effect on mentation in psychotic disorders, the most likely explanation is increased missed doses secondary to impaired judgement.
- Another variable that negatively affects prescription medication adherence in the past *one year* of the patient encounter in both univariate and multivariate analysis was total number of medications. In brief, as the total number of medications a given patient was taking increased so did the odds that the patient would miss prescription medication doses.
- The effect of "polypharmacy" is well characterized in the literature and is a targeting intervention in many primary clinics to reduce the overall number of medications a given patient is taking in order to simplify therapy regimens with hopes to decrease confusion and adverse medication events.

Impact of health literacy on medication adherence

- Contrary to expectation, missed doses did not increase directly with decreasing health literacy: 'somewhat confident' patients had the highest association with missed doses compared to patients with lower health literacy levels.
- One possible explanation for this result is 'somewhat confident' patients may be overestimating their ability and therefore accept less help, while patients with lower levels of health literacy– 'not confident' and 'proxy'—missed fewer doses because they acknowledge limitations & are willing to accept more assistance.

Future Work

- This work focuses on the process measure in identifying targetable barriers to medication adherence.
- Looking forward, we hope to address the findings of this study with an outcome measure by initiating appropriate interventions by the interdisciplinary care team at SHOW clinic. We plan to reassess medication adherence in returning patients after interventions have been implemented.

Acknowledgements