Published in final edited form as:

J Pharm Technol. 2010 ; 26(5): 271–275. doi:10.1177/875512251002600504.

Community Pharmacy Use Patterns of Women with HIV and Women At Risk for HIV in the San Francisco Bay Area

Jennifer Cocohoba, Pharm.D., BCPS [Health Sciences Associate Clinical Professor],
Department of Clinical Pharmacy, University of California, San Francisco School of Pharmacy,
521 Parnassus Avenue, C-152, Box 0622, San Francisco, CA 94143, Telephone: (415)
514-0892, Fax: (415) 476-6632, cocohobaj@pharmacy.ucsf.edu

Tracy Hsu, Pharm.D., BCPS [Clinical Pharmacist], and
Department of Pharmacy, San Francisco Veterans Affairs Medical Center

Ruth M. Greenblatt, MD [Professor]
Medicine, Epidemiology and Biostatistics, and Clinical Pharmacy, University of California, San
Francisco Schools of Medicine & Pharmacy

Abstract

Background—Community pharmacies play a key role in the care of patients when dispensing antiretroviral therapy. The primary objective of this study was to describe patterns of community pharmacy use of women enrolled in the San Francisco site of the Women's Interagency HIV Study (WIHS). The secondary objective was to determine whether the number of pharmacies a patient uses is associated with specific patient characteristics or virologic outcomes in HIV positive women.

Objectives—The primary objective was to determine factors which were associated with using multiple dispensing pharmacies to obtain medications in a population of HIV+ and at-risk women. The secondary objective was to determine whether use of multiple pharmacies was associated with immunologic or virologic changes for the subset of HIV+ women.

Methods—A survey on community pharmacy use was distributed to San Francisco WIHS participants from 2004–2007. Poisson, linear, and logistic regression methods were used to determine associations between specific patient characteristics and use of multiple dispensing pharmacies and associations between multiple pharmacy use and CD4+ cell count or viral load changes.

Results—There was a trend towards an association between HIV status and use of multiple pharmacies (IRR=1.23; 95% CI 1.00–1.51, $p=0.05$). In multivariable analyses of HIV positive women, use of additional pharmacies (over the primary pharmacy) during the study period was not associated with statistically significant changes in CD4+ count or viral load.

Conclusion—HIV positive participants may tend to use multiple pharmacies more frequently than their HIV negative counterparts, though this practice does not appear to be associated with

poorer immunologic or virologic outcomes. Future studies should be conducted to determine whether different patient patterns of community pharmacy use affect HIV treatment outcomes.

Keywords

HIV; community pharmacy; women

Introduction

Antiretroviral therapy (ART) has revolutionized the treatment of HIV infection since its widespread introduction in 1996.¹ Community pharmacies can play a key role when dispensing these life-extending medications. In an ideal model, pharmacists build trusted relationships with patients, provide medication counseling, monitor safety and efficacy of antiretroviral regimens, and reinforce treatment adherence.^{2, 3} Within this ideal model, patients view their visits to their pharmacy as an important part of their health care.

Pharmacists often encourage HIV-positive patients to have a community pharmacy “home”, where they keep all of their prescriptions. This is because HIV positive patients may require care from several different clinicians – for example, a primary care provider, an HIV specialist, a cardiologist, a hepatologist – who may not have linked medical records and may not be aware what the other clinicians are prescribing. If such a patient were to use multiple pharmacies, they may be at risk for significant drug interactions, additive adverse effects, or duplicate therapies. Most major community pharmacy chains have integrated computer systems which effectively allow a patient’s record to be accessible by any pharmacist within the chain, but not all pharmacies are linked in that manner. The primary objective of this study was to describe patterns of community pharmacy use, including the types and number used, by women enrolled in the San Francisco site of the Women’s Interagency HIV Study (WIHS). The secondary objectives were to determine what factors are associated with using multiple dispensing pharmacies, and whether this behavior is associated with immunologic and virologic outcomes in HIV positive women.

Methods

The WIHS is a multicenter, longitudinal, observational, prospective cohort study of the natural history of HIV infection in United States women. Data are collected from HIV positive women and HIV negative women at risk for acquiring HIV infection at six study sites (Los Angeles, San Francisco, Chicago, Bronx, Brooklyn, Washington D.C.) and one data coordinating center (Baltimore). Participants are interviewed at semi-annual visits. A variety of laboratory, clinical, demographic, and psychosocial assessments are performed.^{4, 5} CD4+ cell count and HIV-RNA are measured using standard techniques at laboratories which participate in National Institutes of Health/National Institute of Allergies and Infectious Diseases quality assurance programs. The WIHS does not provide clinical care, therefore all medications are prescribed by the participant’s own clinician.

A brief survey form documenting community pharmacy use was instituted for the San Francisco WIHS site. Participants were asked to fill out this form at each WIHS study visit occurring between 2004–2007. Any woman who self-reported taking medications for any

chronic disease and who filled out at least one pharmacy survey during the study period was included in the analysis. Approval for this study was obtained from the University of California San Francisco Institutional Review Board.

Outcomes of interest

The primary outcome of interest was the number of community pharmacies a participant self-reported using. In the community pharmacy survey form, participants filled in names and addresses of each pharmacy they had used to obtain any prescription medications since the last WIHS study visit. These forms were used to calculate the number of different pharmacies reported by each individual. Pharmacy names and addresses were clarified using the Internet and by telephone calls when a telephone number was available. If a pharmacy's name could not be discerned from the survey form it was labeled "pharmacy unknown". For chain and independent pharmacies with multiple store locations, each location reported was counted as a separate pharmacy. If the participant reported the name of a pharmacy which has multiple store locations, but the exact store used could not be determined, it was categorized as "Pharmacy Name, City, unknown". If a patient had multiple "unknown" pharmacy entries over the three year study period, only the first was unknown of its type was counted. The rest were assumed to be duplicates. (For example, if a patient reported using "Chain Pharmacy, unknown location" every year for three years, this was counted as one pharmacy, rather than 3 different pharmacies.) Investigators chose to count only the first "unknown" pharmacy because this would result in obtaining a conservative estimate of the different pharmacies a participant used, rather than overestimating the unknowns. Pharmacies were classified as chain, hospital/clinic associated, independent, or unknown pharmacies based on prior investigator knowledge and telephone calls made to the pharmacies for clarification.

For the subgroup of HIV+ positive patients taking antiretrovirals, we wanted to assess the association (if any) between changes in CD4+ cell counts and HIV viral loads and use of multiple dispensing pharmacies. Baseline CD4+ cell counts and HIV viral loads were measured at the first study visit a community pharmacy survey was filled out. These were compared to subsequent measurements taken at additional study visits at which the community pharmacy survey forms were filled out.

Covariates

Data routinely collected at WIHS study visits were included in the analyses. Race was measured by self-report upon initial enrollment into WIHS. Participants' self-reported highest educational attainment, annual household income, marital status, sexual identity, place of residence, health insurance, employment status, drug and alcohol use in the last six months, presence of depressive symptoms (Center for Epidemiologic Studies Depression Score 16) or other presence of other co-morbid conditions was measured at the first study visit in which the community pharmacy survey was completed, HIV-specific data included HIV status, whether a participant had an AIDS diagnosis, and the study date she reported first taking ART. Baseline CD4+ cell count and HIV viral load were measured at the first study visit a participant filled out a community pharmacy use survey, and were measured at each subsequent study visit thereafter.

Statistical Analysis

Repeated measures Poisson regression was used to assess the association between various patient characteristics and the number of pharmacies at each study visit. Covariates included for face validity in the multivariable model were HIV status, race, education, residence, employment, income, drug and alcohol use, hypertension, diabetes, hyperlipidemia, depression score, and study visit number. A backwards selection process including variables with a p-value of ≤ 0.2 was used to determine the most parsimonious model for the multivariate analysis of characteristics associated with multiple pharmacy use. Repeated measures linear and logistic regression methods using generalized estimating equations were used to assess the relationship between the number of pharmacies and changes in CD4+ cell count or viral load. Models were adjusted for adherence, employment, insurance, depression score, AIDS, number of years taking antiretrovirals, number of antiretrovirals taken, type of pharmacy use, and visit number. All analyses were performed using STATA (StataCorp, TX) version 10.0.

Results

Six WIHS study visits occurred between 2004–2007 for 352 participants. On average, each participant filled out a median of 5 pharmacy surveys (SD= 1.38) and was followed for an average of 2.2 person years (95% CI = 2.06 – 2.25). At least 300 unique pharmacy stores were frequented by the participants. There were 14 entries where the pharmacy name could not be determined from the survey form (“unknown”). There were 163 entries where the pharmacy name was determined but its exact location was not (“Pharmacy Name, City, unknown”). Women reported using an average of 2.7 (SD= 1.5, range 1–7) pharmacies over the 2004–2007 study period (Table 1). Most women (64%) identified one pharmacy that they were primarily using over the last six-month study period. The most common types of pharmacies reported by participants were chain pharmacies (68%), hospital or clinic associated pharmacies (43%) and independent pharmacies (46%).

To determine what factors were associated with using multiple dispensing pharmacies, characteristics of the 352 participants were analyzed. The majority of participants were HIV positive, African-American, of low-income background, and had co-morbidities such as diabetes, hypertension, and hyperlipidemia (Table 2). In univariate analyses, HIV positive status was the only factor associated with using more than one pharmacy over the study period (IRR=1.24; 95% CI 1.01 – 1.53, $p=0.04$). This association was no longer statistically significant when adjusted for employment in the multivariable analysis (IRR=1.23; 95% CI 1.00–1.51, $p=0.05$). Among HIV positive women on ART, using multiple pharmacies was associated with a non-statistically significant 5% decrease (95% CI –11% – 2%, $p=0.13$) in mean CD4+ count for each additional pharmacy used over the primary pharmacy after adjustment of other factors which may influence CD4+ cell count rise or decline. Using multiple pharmacies over the study period was not associated with a higher likelihood of having a detectable viral load (adjusted OR=1.19; 95% CI 0.96–1.48; $p=0.12$).

Discussion

Clinicians may take for granted that the seemingly simple task of acquiring medications from a pharmacy may require a certain level of organizational skills. However, the use of multiple pharmacies is usually not favored by clinicians. When multiple pharmacies are involved it can make reconciling a patient's home medications more difficult. This is especially true when a patient uses pharmacies which do not have linked pharmacy records – for example, if a patient were to obtain their HIV medicines at an independent specialty pharmacy, but obtain their other routine meds at their local chain pharmacy. In addition, patients who are disorganized may find it difficult to keep track of and remember to obtain and take all of their medications on time if they fill them at multiple pharmacies.

Our study found that HIV positive women used multiple pharmacies more often compared to their HIV negative counterparts, although the association was not statistically significant when adjusted for employment. A study in elderly Department of Defense beneficiaries found that having greater than 10 medications was associated with the behavior of using multiple dispensing pharmacies (AOR = 8.43; 95% CI, 8.21–8.65).⁶ In our study, having a chronic condition such as diabetes, hypertension or hyperlipidemia was not associated with using multiple pharmacies even though treatment of these conditions also often involves taking multiple medications. It is possible that HIV antiretrovirals are not routinely stocked in all pharmacies, requiring HIV-positive patients to use more than one pharmacy to obtain all necessary medications. Employed patients may choose to frequent a pharmacy near their work as well as one near their home for convenience.

Despite the negative impressions attributed to using multiple dispensing pharmacies, our study found that this behavior was not associated with poorer HIV treatment outcomes. Few published studies have looked at the number of pharmacies patients use and how that impacts treatment outcomes. One Canadian study found that using a single dispensing pharmacy lowered the risk of inappropriate drug combinations in elderly patients (OR 0.68; 99% CI 0.6–0.8).⁷ Based on this, pharmacists caring for HIV-positive patients should inquire if they are also obtaining medicines elsewhere, and should communicate with the patient's other pharmacists and health care providers in order to lower the risk of drug interactions. Further studies are needed to affirm whether using multiple dispensing pharmacies (or having other pharmacy utilization patterns) can impact HIV treatment outcomes. Not only the number, but the type of pharmacy a patient chooses may predict HIV treatment outcomes; in one study, patients who used a hospital-associated pharmacy had higher refill adherence to ART.⁸ Future studies should also look at whether HIV specialty pharmacies versus traditional community pharmacies or increasing the distance a patient must travel to arrive at a pharmacy may make a difference in adherence or treatment outcomes.

The limitations of our study included the retrospective, self-reported nature of pharmacy use. This could have introduced recall bias that underrepresented the true number of pharmacies a participant used during the study period. Due to the nature of the data collection, certain assumptions were made during the counting and categorizing of pharmacies (e.g. pharmacy “unknown”) which may have also underestimated the number of

pharmacies. HIV negative women in the WIHS study are at risk for acquiring HIV infection therefore their group may not be generalizable to other HIV seronegative women in the United States. Lastly, this study was conducted in the San Francisco Bay Area which has a high density of HIV positive patients and pharmacies therefore the results may not be generalizable to HIV communities in other locations.

Conclusion

HIV-positive participants trended towards a higher risk of using more than one pharmacy to obtain prescription medications in our study. Pharmacists should inquire about multiple pharmacy usage to lower the chances of drug interactions and duplicate therapies for their HIV-positive patients. However, an HIV-positive participant's self-reported use of multiple dispensing community pharmacies was not associated with lower CD4+ cell counts or having a detectable viral load. Future research on patterns of community pharmacy use in HIV-positive patients will be useful in establishing HIV-specific community pharmacy programs, can inform clinicians as to the optimal use of pharmacies to dispense antiretrovirals, and can provide a rationale for establishing pharmacies in areas with a higher density of HIV positive patients.

Acknowledgements

The authors would like to express their gratitude to the following individuals for their help with data extraction and statistical analyses for this study: Niloufar Ameli, MS, Adam Cheng, Ashley Diaz, Nancy Hessel, PhD, and Eric Vittinghoff, PhD, MPH.

The WIHS is funded by the National Institute of Allergy and Infectious Diseases with supplemental funding from the National Cancer Institute and the National Institute on Drug Abuse (U01-AI-35004, U01-AI-31834, U01-AI-34994, U01-AI-34989, U01-AI-34993, and U01-AI-42590). Funding is also provided by the National Institute of Child Health and Human Development (grant U01-HD-23632) and the National Center for Research Resources (grants MO1-RR-00071, MO1-RR-00079, MO1-RR-00083). Dr. Cocohoba's research is supported by the NIH-K12 BIRCWH program at UCSF #9 K12 HD052163 and NIH-NIMH K23MH087218.

References

1. Palella FJ Jr, Delaney KM, Moorman AC, et al. Declining morbidity and mortality among patients with advanced human immunodeficiency virus infection. HIV Outpatient Study Investigators. *N Engl J Med*. 1998; 338:853–860. [PubMed: 9516219]
2. Barnett MJ, Frank J, Wehring H, et al. Analysis of pharmacist-provided medication therapy management (MTM) services in community pharmacies over 7 years. *J Manag Care Pharm*. 2009; 15:18–31. [PubMed: 19125547]
3. Hugtenburg JG, Borgsteede SD, Beckeringh JJ. Medication review and patient counselling at discharge from the hospital by community pharmacists. *Pharm World Sci*. 2009; 31:630–637. [PubMed: 19649720]
4. Bacon MC, von Wyl V, Alden C, et al. The Women's Interagency HIV Study: an observational cohort brings clinical sciences to the bench. *Clin Diagn Lab Immunol*. 2005; 12:1013–1019. [PubMed: 16148165]
5. Barkan SE, Melnick SL, Preston-Martin S, et al. The Women's Interagency HIV Study. WIHS Collaborative Study Group. *Epidemiology*. 1998; 9:117–125. [PubMed: 9504278]
6. Linton A, Garber M, Fagan NK, Peterson M. Factors associated with choice of pharmacy setting among DoD health care beneficiaries aged 65 years or older. *J Manag Care Pharm*. 2007; 13:677–686. [PubMed: 17970605]

7. Tamblyn RM, McLeod PJ, Abrahamowicz M, Laprise R. Do too many cooks spoil the broth? Multiple physician involvement in medical management of elderly patients and potentially inappropriate drug combinations. *CMAJ*. 1996; 154:1177–1184. [PubMed: 8612253]
8. Castillo E, Palepu A, Beardsell A, et al. Outpatient pharmacy care and HIV viral load response among patients on HAART. *AIDS Care*. 2004; 16:446–457. [PubMed: 15203413]

Table 1**Pharmacy Use in the San Francisco Womens Interagency HIV Study 2004–2007**

	HIV – (n=103)	HIV + (n=249)	Total (n=352)
Number of pharmacies reported 2004–2007 per patient, mean (SD) ^a	2.4 (1.5)	2.9 (1.5)	2.7 (1.5)
Proportion of participants who had ever used various pharmacy types over study period, % (n)			
Chain Drug Store	77% (79)	65% (162)	68% (241)
Hospital/clinic associated pharmacy	43% (44)	43% (106)	43% (150)
Independent pharmacy	23% (24)	55% (137)	46% (161)
Mail order	1% (1)	3% (7)	2% (8)
Other	2% (2)	3% (7)	3% (9)
Average number of pharmacies used since last study visit, n (%)			
1 since last study visit ^b	62 (60)	136 (55)	198 (56)
2 since last study visit	35 (34)	92 (37)	127 (36)
3 since last study visit	5 (5)	18 (7)	23 (7)
4 since last study visit	1 (1)	2 (0.8)	3 (1)
5 since last study visit	0 (0)	1 (0.4)	1 (0)

^aStandard deviation^bWHHS study visits occur semi-annually, therefore approximately 6 months passes between study visits.

Table 2Characteristics associated with use of multiple dispensing pharmacies^a

	N (%)	IRR ^b (95% CI)	p-value
HIV positive status	249 (71)	1.24 (1.01 – 1.53)	0.04
Race			0.34
Caucasian	94 (27)	---	
African American	183 (52)	1.14 (0.92 – 1.43)	
Asian/Pacific Islander	8 (2)	0.84 (0.42 – 1.68)	
Other	67 (19)	0.95 (0.71 – 1.26)	
Education			0.92
Did not finish high school	106 (30)	---	
Finished high school	119 (34)	1.01 (0.81 – 1.28)	
Some college	98 (28)	1.00 (0.78 – 1.28)	
Finished college or beyond	29 (8)	0.89 (0.61 – 1.30)	
Sexual identity			0.79
Heterosexual	269 (76)	---	
Bisexual	55 (16)	1.06 (0.82 – 1.38)	
Gay	20 (6)	0.89 (0.59 – 1.35)	
Other/missing	8 (2)	1.28 (0.62 – 2.65)	
Marital Status			0.81
Married	75 (21)	---	
Living with partner	39 (11)	1.04 (0.85 – 1.27)	
Widowed/divorced	96 (27)	1.06 (0.90 – 1.25)	
Never married	95 (27)	0.97 (0.80 – 1.18)	
Other/missing	47 (13)	0.97 (0.78 – 1.20)	
Residence			0.95
Living in own house/apartment	264 (75)	---	
Living in someone else's house	45 (13)	1.02 (0.87 – 1.19)	
Living in unstable/temporary housing	31 (9)	1.06 (0.90 – 1.25)	
Living on street	5 (1)	0.94 (0.56 – 1.59)	
Other/missing	7 (2)	1.07 (0.83 – 1.37)	
Employed	107 (30)	0.88 (0.77 – 1.01)	0.08
Has insurance	319 (91)	1.09 (0.88 – 1.35)	0.43
Income level			0.47
\$12,000 or less	180 (51)	---	
\$12,001 – \$24,000	71 (20)	0.98 (0.86 – 1.12)	
\$24,001 – \$36,000	40 (11)	0.91 (0.76 – 1.10)	
\$36,000 or greater	34 (10)	0.85 (0.68 – 1.05)	
Alcohol use			0.82
Light (0–3 drinks/week)	280 (80)	---	
Moderate (3–13 drinks/week)	53 (15)	0.95 (0.81 – 1.12)	
Heavy (> 13 drinks/week)	12 (3)	0.98 (0.77 – 1.25)	

	N (%)	IRR ^b (95% CI)	p-value
Depression (CES-D > 16) ^c	181 (51)	1.04 (0.94 – 1.14)	0.47
Drug use in last 6 months	72 (20)	1.05 (0.92 – 1.19)	0.48
Hypertension	267 (76)	1.00 (0.84 – 1.19)	0.99
Diabetes	323 (92)	0.93 (0.69 – 1.26)	0.63
Hypercholesterolemia	307 (87)	0.97 (0.76 – 1.24)	0.79

^a Values may not add up to 100% due to missing data (total n=352)

^b Incidence Rate Ratio

^c Center for Epidemiologic Studies Depression Score