

# Medical Adherence among Asthma Patients when Health Insurance Plans Change

Kimberly Drangeid

Faculty Sponsor: Mary Hamman, Economics

## ABSTRACT

Healthcare costs in the U.S are the highest among countries and are continuing to increase. Contributing to these costs is medical adherence, a measure of if a patient is taking their medications or following doctors' orders correctly. Medical nonadherence represent 3-10% of all U.S healthcare costs (Iuga & McGuire, 2014). Chronically ill patients have a higher nonadherence rate of around 50% (Chisholm-Burns & Spivey, 2003). Chronic patients with asthma especially have a high medical nonadherence rate of between 30-70% and consist of eight percent of the U.S population. Being such a large proportion of the U.S, changes in healthcare policies concerning asthma patients have a great effect on many Americans. In 2010 the Affordable Care Act (ACA) led to major restructuring in the health insurance market; new requirements led customers to look elsewhere in the market for better prices resulting in insurance plan switches, called churning. From 2015 to 2016 two thirds of the 12.7 million people with insurance through Healthcare.gov changed their health insurance plan from the previous year (Avalere Health, 2016). Now, in 2016, a new president has been elected that threatens the ACA of being repealed or replaced in the coming years. Many evolving proposals for replacement feature consumer choice as a key factor which implies plan switching may continue or increase. It is important to examine the effects churning would have. One group of researchers found that stronger patient-provider relationships in HIV patients were associated with higher medical adherence (Schneider et. al, 2004). When patient-provider relationships are disrupted because of churning, medical adherence is likely to decrease. With asthma patients consisting so much of our population, it is especially important to examine how churning can affect their medical adherence. This study will investigate if changing insurance plans negatively affects medical adherence for asthma patients.

## INTRODUCTION

The House of Representatives recently passed a measure concerning changes to the Affordable Care Act. The bill will now be put to a vote by the Senate to determine whether American's healthcare will change and once again cause them to change insurance plans. Major health policies are always up for debate, and constantly being revised causing many people's coverage to change as well. Transitioning between insurance coverage plans is called churning, and can cause a disruption in the continuity of care a patient receives. Continuity of care is the ongoing cooperative care of a patient managed by the provider team to reach shared goals (American Academy of Family Physicians, 1983). This continuity of care can be disrupted when there is a change in healthcare provider that can stem from churning, causing the effects to be important knowledge. This study examines the effects of churning on patients' medical adherence, meaning whether patients are taking their medications according to their doctor's orders. This study examines whether individuals who change health insurance plans will have lower rates of medical adherence than those who keep the same plan.

### Effects of Healthcare Policy

Healthcare policies often change and can have a large effect on many lives. When the Affordable Care Act (ACA) was put into place in 2010, it changed many insurance plans and requirements. Health insurance providers now had more guidelines from the ACA to follow and many were required to change the plans they offered. Because of these required additions, health insurance premiums rose in the private health insurance market and in the plans that employers provided. Increased premiums can cause customers and employers to find cheaper prices and in result, change health insurance plans and increase churning.

The new bill republicans are currently attempting to pass would also affect Americans' insurance plan choices. Individuals with pre-existing conditions would no longer be assured healthcare everywhere. These individuals may then not get the healthcare help they need and in result have lower health and/or medical adherence. In addition to this, people may be faced with increases in churning that may also cause poor outcomes of lower health and medical nonadherence.

### **Medical Nonadherence**

Medical nonadherence is a serious issue in this country. The U.S already spends two-and-a-half times the average healthcare spending of developed nations and these costs are only rising (Kane, 2012). Medical nonadherence represent 3% to 10% of all U.S healthcare costs (Iuga & McGuire, 2014). This cost in spending is equal to 100 to 300 million dollars annually. Nonadherence does not only affect expenses in the U.S but also patients' safety. The World Health Organization (WHO) reported that the average rate of nonadherence in chronically ill patients is 50% (Chisholm-Burns & Spivey, 2003). In order to improve the quality of medical services and adherence, our policies should include this information in making future decisions

### **Prevalence in Asthma Patients**

Asthma is a chronic disease most patients deal with controlling their whole life. Although asthma patients account for eight percent of the population, their healthcare costs in the U.S. account for \$56 billion (Center for Disease Control and Prevention, 2011). Asthma patients are a good sample to study because they have relatively higher medical nonadherence with preventative/controlling medications. Asthma patients have a wide medical nonadherence range of 30-70% (WHO, 2003). With billions of dollars going towards helping this disease, medical nonadherence is an additional price we cannot afford.

## **METHODS**

This study attempts to determine if individuals who change health insurance plans will have lower rates of medical adherence than those who keep the same plan. This lower adherence will be apparent in higher rates of relief medication usage.

### **National Health interview Survey**

The data on asthma patients was provided from IPUMS Health Surveys that included survey information from The National Health Interview Survey (NHIS). This survey collected self-reported responses on health and healthcare access from individuals with prescribed asthma medications. Data was pulled from the year 2013 and respondent parameters included only those that were currently insured and continuously had insurance for the past year. Respondents included all ages up to 85 years, individuals of all different races, education, and income levels.

### **Measuring Variables**

In order to measure medical adherence in the respondents, the type of medication the patient used was surveyed. One type is a control medication that many patients (31.6%) are told to take on a regular basis to keep their asthma condition stable. When patients are taking these controllers, they have good medical adherence. Patients who do not take their control medication as directed are likely to rely on relief medications more often. A patient has worse medical adherence when they are not using their control medication and relying only on using "relief" medications.

In this study, the sample included only asthma patients that were prescribed "control" asthma medication and asked if they have used their "relief" medication in the previous three months. Use of relief medication is an indicator of poor adherence to control medication protocols and is the dependent variable in the analysis.

For the simple regression part of the analysis, the independent variable in this analysis is identified with either a 1 or a 0, where 1 indicates that the respondent had switched health insurance coverage within the last year. The dependent variable in this analysis is also identified with either a 1 or a 0. In this case, 1 indicates that the respondent had taken their relief medication in the past 3 months. The model used for this simple regression is shown below in Figure 1.

$$ReliefMed = \beta_0 + \beta_1 SwitchPlans + u$$

**Figure 1.** Model for simple linear regression.

### Control for Bias

After the simple regression was ran, a multiple regression was ran that included the same two variables, switching insurance plans and relief medication. This regression included control variables standard in prior studies of medical adherence, including socioeconomic and demographic characteristics such as income levels, education, age, and race.

Income and education levels need to be controlled for in this study so it does not bias the coefficient estimates. Income may be correlated to individual's medical adherence. Those with lower incomes are more inclined to "shop" for better health insurance and change plans because their insurance does not typically cover as much. Lower income individuals are also correlated with lower medical adherence because they may not be able to afford the medication, and opt out of taking it. Without controlling for the income effect would show an overestimate in medical nonadherence of those that switch plans.

Education must also be controlled for in this model because of the correlation it has with better insurance benefits, meaning they want to switch health insurance plans. People with higher levels of education also have better medical adherence (Hope et al., 2004). Without controlling for education would give an overestimate as well of medical nonadherence in those that switch insurance plans.

Age was also an important control factor to include in this model. Age is correlated with switching insurance plans because those that are younger change jobs more often and may have to switch plans more often along with this. Younger people may also be less inclined to be concerned about their health at a young age and have worse medical adherence. Without controlling for age would underestimate the medical nonadherence in those that switch health insurance plans.

### Sample

The sample that was used in this study is shown on Table 1 below. The number of observations was low, totaling only 1,695 total. The number of respondents that switched insurance plans was especially low, only totaling 37, or about two percent of the sample. The year 2013 was the only year that the both survey questions on switching insurance plans and taking relief medication were asked, so more data was unable to be used.

**Table 1.** Descriptive statistics of the sample from The National Health Interview Survey in 2013 used.

Response	Value	Observations	Mean	SD
No Change in Health Plan	0	1,655	0.239	0.426
Plan Changed	1	40	0.243	0.435

## RESULTS

Three regressions were ran as a part of the analysis to determine if individuals who change health insurance plans will have lower rates of medical adherence than those who keep the same plan. The Stargazer analysis tool was used to get the coefficient output for the regression model.

The first regression tested switching insurance plans and use of relief medication and indicates patients who changed health insurance were 0.5 percentage points less likely to use relief medication (Figure 2). This estimate is not statistically significant. After controlling for income and education, the estimated difference is -0.2 percentage points but still not statistically significant (Figure 2). The third regression controlled for income, education, and simple demographics like age and race to account for health disparities and found those who switch insurance are 0.7 percentage points less likely to use relief medication (Figure 2). Again, the estimate is not statistically significant.

	Use of Relief Medication		
	(1)	(2)	(3)
Changed Insurance	-0.005 (0.071)	-0.002 (0.071)	-0.007 (0.071)
Income 35,000-49,999		-0.042 (0.035)	-0.046 (0.035)
Income 50,000-74,999		-0.079** (0.031)	-0.080** (0.032)
Income 75,000-99,999		-0.111*** (0.038)	-0.109*** (0.039)
Income 100,000 +		-0.051 (0.031)	-0.049 (0.032)
Income 0-49K, no detail		0.214* (0.129)	0.210 (0.129)
Income 50-99,999, no detail		-0.005 (0.191)	-0.004 (0.191)
Age			-0.001 (0.001)
Race: Black			0.055** (0.026)
Race: Not Black or white			-0.059 (0.048)
Years of Education		0.003 (0.002)	0.005** (0.002)
Constant	0.761*** (0.011)	0.762*** (0.027)	0.749*** (0.031)
Observations	1,621	1,621	1,621
R2	0.00000	0.011	0.016

Note: \*p<0.1; \*\*p<0.05; \*\*\*p<0.01

Figure 2. Output from Stargazer program on analysis; shows the three regressions ran and their output coefficients.

## DISCUSSION

The results of this analysis do not provide support for the hypothesis that people with asthma who switch insurance plans are more likely to exhibit poor medical adherence. Estimates are negative, which means those who switch insurance are less likely to use relief medication, however, these estimates are not statistically significant. If these results hold in a larger sample and become statistically significant, they would imply insurance changes are associated with a 3% reduction in relief medication use at the mean, which is relatively small.

This survey sample reported only two percent switched insurance plans in the last 12 months, much lower than the national average of 16% (Sommers et. al, 2014). This may be due to reverse causality and indicate that asthma patients that are prescribed this medication may avoid switching insurance plans. Those who switch may do so to only when it enables them to better afford treatments, including relief medication.

The medical nonadherence rate, or relief medication use, in this study was measured at 24% compared to the national average of medical nonadherence in asthma patients of 30-70% (WHO, 2003).

### Limitations

This study went through many measures to ensure the best results, but went with having some limitations. The biggest limitation was the size of the sample. As shown above in Table 1, the sample consisted of only 1,665 asthma patients prescribed preventative medication. Although this number is reasonable for research, the variable of interest (switching insurance plans) consisted of only 40 respondents. This gave the study low statistical power that was unable to produce significant results.

The sample used in this experiment did not include those that were uninsured at any time throughout the past year. Many times individuals facing insurance switches have times that they may not be covered. This could contribute to why the number of people switching in plans was low compared to the national average of 16% (Sommers et. al, 2014).

This experiment used cross sectional data from one year. The sample number could have been increased if panel data, or multiple years of data, were used. This was not a possibility with this survey because the two main variables used, switched insurance plans and used relief medication, were never asked in the same year. In addition to the sample size change, more years of data could have been useful by removing bias from estimates. The year 2013 could have had health policy changes that only affected certain groups of people. Using more data would have removed some of the potential bias in this.

Another limitation to this study concerned the age of many of the respondents. About 25% of asthma patients are under 18 years old ("Cost of Asthma", 2017). When this study controlled for age, it did not account for the age of the parent who typically controls the access to medication. This study did not include survey responses for children of the age of their guardian.

Mobility of the individual in the last year was not a variable provided by NHIS, but could have prevented bias. It would have been interesting to include this control when individuals move locations. Many times, people move locations because of a new job or opportunity that would cause them to change health insurance as well. Allergies are also connected to asthma, so moving location may move asthma patients to places that worsen their asthma and require more relief medication use.

### Future Research

Some of the limitations mentioned above in this research could be eliminated in future research and analysis. Other research could also be done on related studies to medical adherence and switching health insurance plans. This study only examined medical adherence in asthma patients, future studies could examine the medical adherence in HIV patients that switch health insurance plans. HIV patients are also known to have a high medical nonadherence rates, totaling 45% among Americans (Schneider et al, 2004).

Future research could also include more controls in their experiment. Medicare often causes older individuals to switch health plans when they turn 65. This age group could be analyzed or controlled for in future research to determine whether medical adherence decreases from switching health insurance plans.

## ACKNOWLEDGMENTS

Thank you to the University of Wisconsin – La Crosse Undergraduate & Creativity department for providing the funding in this project. Another thanks to UWL faculty advisor Mary Hamman for her guidance throughout this project.

## REFERENCES/LITERATURE CITED

- American Academy of Family Physicians. (1983). *Continuity of care, definition of*. Retrieved from <http://www.aafp.org/about/policies/all/definition-care.html>
- Apter, Andrea J., Thomas J. Van Hoof, Tierney E. Sherwin, Barbara A. Casey, Marcia K. Petrillo, and Thomas P. Meehan. "Assessing the Quality of Asthma Care Provided to Medicaid Patients Enrolled in Managed Care Organizations in Connecticut." *Annals of Allergy, Asthma & Immunology* 86.2 (2001): 211-18. Web.
- Avalere Health. (2016). Only 33 percent of exchange enrollees in 2016 kept their same plan from 2015. Retrieved from <http://avalere.com/expertise/managed-care/insights/only-33-percent-of-exchange-enrollees-in-2016-kept-their-same-plan-from-201>
- Buettgens, M., Nichols, A., & Dorn, S. (2012). Timely analysis of immediate health policy issues. Robert Wood Johnson Foundation.
- Centers for Disease Control and Prevention. (2011). Vital Signs.
- Chevarely, Frances M. "Asthma Preventive Medicine in 2006 - Who Takes Them?" Medical Expenditure Survey. Agency for Healthcare Research, 3 Mar. 2009. Web. 15 Apr. 2017.
- Chisholm-Burns, M.A., & Spivey, C.A. (2003). The 'cost' of medication nonadherence: consequences we cannot afford to accept. University of Tennessee. Retrieved from <https://www.ncbi.nlm.nih.gov/pubmed/23229971>
- "Cost of Asthma on Society." Asthma and Allergy Foundation of America, n.d. Web. 17 Apr. 2017.
- Dawood FS, Kamimoto L, D'Mello TA, Reingold A, Gershman K, Meek J, et al. (2011). Children with asthma hospitalized with seasonal or pandemic influenza 2003-2009. *Pediatrics* 2013; 132: 796-804.
- Express Scripts. (2015). The cost of nonadherence. Retrieved from <http://lab.express-scripts.com/lab/insights/~media/a036b78f754b4d80940d03e940e27205.ashx>
- Iuga, A.O., & Mcguire, M.J. (2014). Adherence and health care costs. Dove Medical Press. 7: 35-44.
- Kane, J. (2012). Health Costs: How the U.S. Compares With Other Countries. PBS. Retrieved from <http://www.pbs.org/newshour/rundown/health-costs-how-the-us-compares-with-other-countries/>
- Sarpong, E., Chevarley, F.M. (2012). Trends in the pharmaceutical treatment of asthma in adults, 1998 to 2009. Agency for Healthcare Research and Quality. Retrieved from [https://meps.ahrq.gov/data\\_files/publications/rf33/rf33.shtml](https://meps.ahrq.gov/data_files/publications/rf33/rf33.shtml)
- Schneider, J., Kaplan, S.H., Greenfield, S., Li, W., & Wilson, I.B. (2004). Better Physician-Patient Relationships Are Associated with Higher Reported Adherence to Antiretroviral Therapy in Patients with HIV Infection. *Journal of General Internal Medicine*, 19(11), 1096–1103.
- Sommers, B.D, Musco, T., Finegold, K., Gunja, M.Z., Burke, A., & McDowell, A.M. (2014). Health reform and changes in health insurance coverage in 2014. *The New England Journal of Medicine*, 371, 867-874

World Health Organization. (2003). Adherence. Retrieved from  
[http://www.who.int/chp/knowledge/publications/adherence\\_Section1.pdf](http://www.who.int/chp/knowledge/publications/adherence_Section1.pdf)