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Medication Adherence Rates of Marshallese Patients Treated in a Student-Led Free Clinic

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Abstract

Background: The North Street Clinic is a student-led free clinic providing chronic disease management to the uninsured Marshallese population in Arkansas. Diabetes is a significant health problem for this population with an estimated prevalence of 38% for those living in northwest Arkansas. With a high disease burden, adherence to medication is an important aspect of care. The objective of this study was to measure medication adherence of the North Street Clinic patient population using pharmacy data.
Methods: We evaluated medication adherence rates by reviewing pharmacy refill data to calculate proportion of days covered (PDC) for the therapeutic classes of medications most often prescribed in the clinic (diabetes, hypertension, and cholesterol). PDC of 80% or higher is needed for a patient to receive therapeutic benefit from medications within the classes reviewed.
Results: The average PDC for each therapeutic class ranged from 52%-55%. Within each therapeutic class, only 20% (19%-21%) of patients had a PDC of 80% or higher that would equate to therapeutic benefit from the medication.
Conclusions: Most North Street Clinic patients are not meeting adherence goals to gain therapeutic effect. Future studies are needed in this population to determine exact causes of medication non-adherence and devise interventions to improve adherence. Data can also be used to determine if a program focused on adherence is needed.

Introduction

Historical Context

Marshallese experience significant health disparities including higher rates of type 2 diabetes, lower access to healthcare and decreased rates of adherence to chronic medications. It is important to review the history this migrant population has with the United States (US) to appreciate their unique health disparities. The Republic of the Marshall Islands (RMI) is located near the equator west of the International Date Line in the Pacific Ocean. From 1946-1958, the RMI was the site for 67 nuclear weapons tests performed by the US military. The radiation exposure was equivalent to one Hiroshima-sized bomb dropped every day for 12 years.[1] This nuclear testing program had a profound effect on the health of the people living in the Marshall Islands, including the incidence of diabetes.[2] Prior to nuclear testing, the Marshallese had a low incidence of diabetes.[3] It is now estimated that the Marshallese community has the world's highest rate of persons with diabetes: local health screenings found that 38% of Mar-

shallese in northwest Arkansas have hemoglobin A1c values above 6.5%, indicative of a diagnosis of diabetes.[4-5] For comparison, the rate of diabetes in the general population of adults living in the United States is 12%.[6] A change in diet that occurred after the nuclear fallout has been suggestive of one causative factor.[2,7] Prior to nuclear testing the Marshallese consumed a diet of fish and locally grown fruits and vegetables. After weapons testing, the Marshallese had to rely on imported processed foods which tended to be high in refined carbohydrates and saturated fats such as rice and canned meats.[8] These foods continue to be part of the Marshallese diet in both the RMI and the United States.

In 1986, the United States signed the Compact of Free Association (COFA) with the RMI allowing for a continued US military presence in the RMI and allowing RMI citizens to travel to and from the United States without a visa. Migration to Arkansas started in 1986 and has continued to grow due to availability of jobs, good public education, and affordable cost of living.[1,9] Northwest Arkansas is now home to the highest number of Marshallese in the continental United States with an estimated population of 12,000.[10] Although Marshallese are free to live and work in the United States, they are not citizens and are not eligible for federally funded insurance programs such as Medicare. Additionally, Medicaid coverage is determined by each state and currently adult COFA migrants are not eligible for Arkansas Medicaid. Local data found that 46% of Marshallese in Arkansas lack any form of health insurance.[7] This lack of health insurance has resulted in many Marshallese in northwest Arkansas going without healthcare for their chronic disease management.[7] Additionally, Pacific Islanders living in the United States, specifically Marshallese, are less likely than other ethnic groups to adhere to treatment recommendations for chronic disease management with low medication adherence often cited as a reason.[7,11,12,13] Commonly cited reasons for non-adherence in this population include forgetting to take medication and difficulty paying for prescriptions.[14] A mixed method study in this population reported that 7.5% of patients interviewed forgot to take medications "all the time," 57.5% forgot "sometimes," and 35% "never or rarely" forgot; it also cited financial barriers, with Marshallese patients taking less or none of their prescribed medication or delaying filling a prescription to save money.[14] While these survey-based studies have documented the barriers Marshallese face in accessing care, there is no objective data directly measuring medication adherence rates among Marshallese patients.

Study Aim

The objective of this study was to evaluate medication adherence through assessment of pharmacy claims (medication fill records) of Marshallese patients seen in a student-led free clinic.

Methods

Study Site

The North Street Clinic at the University of Arkansas for Medical Sciences Northwest campus was established in 2014 as a student-led free and charitable clinic offering chronic disease management services to uninsured Marshallese with diabetes. In 2016, the North Street Clinic collaborated with a community-based pharmacy to aid in medication adherence and overcome transportation, language, and financial barriers for patients. The pharmacy is physically located within the Marshallese community and employs native Marshallese staff. Medications for the treatment of diabetes, hypertension, and cholesterol were selected for review as they are the most prescribed medications in the clinic setting and are dispensed through the community pharmacy at no cost to the patient. The medications within each therapeutic category were limited to generic versions with the only injectable agent used being insulin (regular, NPH or 70/30). Each month, the community pharmacy sends prescription claims records to the North Street Clinic for review and reimbursement.

Selection and Description of Participants

The study cohort included Marshallese patients 18 years of age or older receiving care in the North Street Clinic and receiving prescriptions at the partnering community-based pharmacy. Data were extracted from pharmacy records, which were retrospectively reviewed from July 1, 2016 to June 30, 2017 for initial prescription fill and refill data. Information was included in the analy-

Table 1. Demographics of study participants

Characteristics	N (%)
Gender	
Male	57 (37)
Female	96 (63)
Age (years)	
≥67	14 (9)
57-66	48 (31)
47-56	42 (28)
37-46	37 (24)
≥18-36	12 (8)

sis if the patient had at least one medication within any of these therapeutic classes filled within the study period. Patients were excluded if they had only one medication fill date with a days supply that exceeded the end date of the study (which would result in ≥100% adherence). Prescription information data collected included gender, year of birth, medication dispensed, date dispensed, quantity dispensed, days supply, and provider. All identifiable patient information was transformed into study codes accessible only to the primary author. The institutional review board at the University of Arkansas for Medical Sciences approved the study.

Measure of Adherence

The medication adherence method utilized was calculation of proportion of days covered (PDC).[15-19] PDC is the number of days covered by at least one medication within the therapeutic class divided by the number of days in the treatment period. This calculates the percent of time a medication is "in hand" and available for the patient to take. Quantity of medication was determined by adding the day supply for at least one medication within the therapeutic class for the period of enrollment. If prescriptions for the same medication or same therapeutic class overlapped, then the prescription start date was adjusted to be the day after the previous fill had ended. Therapeutic class rather than individual medications was selected as the measure to avoid falsely low calculations based on patients changing medications within a class. For example, if a patient had lisinopril filled for 30 days followed by losartan filled for 30 days, the 60-day PDC would be 50% for each medication, yet 100% for the hypertension therapeutic class. The treatment period was defined as the first fill date of the prescription to the end of the study period or patient transfer. Research on diabetes and cardiovascular agents has shown that the level of the PDC at which there is a reasonable likelihood of achieving potential clinical benefit is 80%.[20-26] Additionally, the Centers for Medicare and Medicaid Services (CMS) evaluate the number of participants achieving a PDC ≥80% for diabetes, hypertensive and cholesterol medication in their star rating of health plans.[27]

Data Analysis

SPSS version 24 was used for all statistical analyses. Analysis of variance (ANOVA) was used to compare mean PDC between genders and among age groups for each therapeutic class. Logistic regression was used to explore whether gender and age predicted meeting the threshold of at least 80% PDC for each class.

Results

During the study period, 153 unique patients received medications from the community pharmacy. Patients were mostly female (N= 96, 63%) and ages 57-66 (31%) (Table 1). The majority of patients (77%) received more than one fill of any prescription medication during the study period. Results are presented below by therapeutic category. All p-values mentioned below were obtained from ANOVA.

Diabetes

During the study period, 138 patients (90% of the study population) had prescriptions filled for medications that lower blood sugar. The average PDC for any diabetes medication was 54% (range 4%-100%). Only 29 patients (21%) taking glucose lowering medication had a PDC of ≥80% (Table 2). The average PDC for the patients with more than one fill in this therapeutic category (N=108) was 54% (range 16%-100%), with 23 patients (21%) having a PDC ≥80%. There were no differences in mean PDC between age groups (p=0.69) or by gender (p=0.21).

Table 2. Proportions of days covered (PDC) ≥80% per therapeutic class

Therapeutic Class	N (%) with ≥80% PDC*
Diabetes (N=138)	29 (21)
Hypertension (N=83)	16 (19)
Hyperlipidemia (N=54)	11 (20)

**PDC ≥80% provides reasonable likelihood that patient is receiving therapeutic benefit for drugs used to treat diabetes or cardiovascular disease*

Hypertension

During the study period, 83 patients (54% of the study population) had prescriptions filled for medications that lower blood pressure. The average PDC for the population for any antihypertensive was 53% (range 11%-100%), with 16 patients (19%) having a PDC of ≥80% (Table 2). The average PDC for the patients with more than one fill in this therapeutic category (N=73) was 53% (range 12%-100%), with 13 patients (18%) having a PDC ≥80%. There were no differences in mean PDC between age groups (p=0.30) or by gender (p=0.30).

Cholesterol

During the study period, 54 patients (35% of study population) had prescriptions filled for medications that lower cholesterol. The average PDC for any cholesterol-lowering medication was 52% (range 9%-100%), with 11 patients (20%) having a PDC of ≥80% (Table 2). The average PDC for the patients with more than one fill in this therapeutic category (N=44) was 55% (range 10%-100%), with 10 patients (23%) having a PDC ≥80%. There were no differences in mean PDC between age groups (p=0.60) or by gender (p=1.00).

Discussion

Research on medication adherence in the Marshallese population or free clinic population is limited. Medication fill records were reviewed to determine PDC for the most common medication classes prescribed in this clinic, using a PDC of ≥80% as the threshold for medication adherence rates resulting in therapeutic efficacy. Our results indicate that only 20% of patients met this threshold.

This is the first study to objectively measure medication adherence rates through pharmacy claims in this population. Other adherence studies have been based on survey data completed by patients, which relies on patient recall, and have produced variable results. One study of Marshallese patients showed a self-reported daily adherence rate to medications to be 49%, a higher adherence rate than we calculated, with 19% stating they not take their medication at all.[28] Additional research looking at survey data has shown that Asian/Pacific Islanders as a group have medication adherence of approximately 11%, which is much lower than the rate we calculated.[29] One study among Native Hawaiian Pacific Islanders including Marshallese patients found cost-related non-adherence to medication in 22% of patients with one chronic disease and 25% in those with two or more chronic diseases; however, this study reported 93.6% of participants had insurance coverage, whereas the population we evaluated did not have any type of insurance.[13] The most common reasons cited by Marshallese patients for non-adherence were forgetting to take medication and difficulty paying for prescriptions.[14] Our study population had access to these medications at no out-of-pocket cost, which would eliminate at least one of these barriers.

Studies done in other populations with insurance show that adherence was better than the rates we found. A recent study done in the United Kingdom evaluated adherence through the presence of medication metabolites in the urine. Of the 228 patients evaluated, 164 (71.9%) patients were adherent to antidiabetic, antihypertensive, and/or lipid-lowering medications.[30] A study done in the United States evaluated adherence using a similar method to our study (pharmacy database and prescription claims) from patients with prescription drug insurance, and found that out of 218,384 patients, 151,010 (69%) had a PDC ≥80% for glucose lowering medications.[31] These differences may represent the effect of insurance coverage on medication adherence: the United Kingdom study was done in a country that has government sponsored universal healthcare while in the latter study, all participants had insurance.

Previous studies suggested that age and sex are associated with increased medication adherence. A 2016 study done in Switzerland in patients with insurance evaluated adherence to oral hypo-

glycemic medications.[32] The overall PDC was 70% with 42% of patients having a PDC ≥80%; male sex and older age were predictors of achieving a PDC ≥80%, with patients aged 65-74 twice as likely to be adherent as younger patients. However, our study found no association with age or sex.

Although not evaluated in this study, there could be numerous reasons for medication non-adherence in the Marshallese population, including a lack of understanding of the United States healthcare system and how to obtain medications. In the Marshall Islands, patients receive medications within a healthcare provider visit and usually do not have to take the additional step of going to a pharmacy to fill prescriptions. There is limited emphasis on chronic disease management, especially in the outer islands. Thus, the concept of refilling a medication or needing a medication long-term is not intuitive. Another reason is that being diagnosed with diabetes is stigmatized within the Marshallese community, which could prevent patients from seeking refills or continuing to take their medication.[7] Although the pharmacy was located within the Marshallese community, transportation to get refills could have also contributed to non-adherence: a previous study of Marshallese in Arkansas noted lack of personal and public transportation as a barrier to accessing health care services.[7] Although Marshallese community health workers serve as translators for the clinic, and the pharmacy employs native Marshallese to aid with patient counseling, there could have been miscommunication related to medication instructions due to language barriers. Lastly, studies have shown that elders in the Marshallese community have resentment and distrust of American norms due to the nuclear testing.[7] This may have resulted in non-adherence to treatment plans for their chronic disease.

The low level of medication adherence uncovered in this study combined with the large health disparities already faced by the Marshallese population is concerning. To ensure positive long-term health outcomes, chronic disease management plans must emphasize medication adherence and address reasons for non-adherence. Methods to increase adherence rates should be a primary consideration in this patient population. Future studies evaluating medication adherence related to clinical measurements of disease control (such as blood pressure and hemoglobin A1c) are needed.

Many times in clinical settings, providers question patients about medication adherence, which relies on patient memory. Rarely is there an objective adherence measurement available. Student-led clinics with on-site pharmacies, or partnerships with community pharmacies, could evaluate medication adherence through this process. This would provide a more accurate assessment of adherence than methods relying on patient recall. Results could be used to evaluate level of chronic medication adherence and determine if programs focused on adherence are needed.

Limitations

This study's results should be viewed in light of some limitations. Data was collected from only one pharmacy. Although patients were free to use any pharmacy of their choosing, patients had no out-of-pocket costs for medications within the therapeutic classes reviewed when filling prescriptions at the community pharmacy associated with the clinic. The community pharmacy is also located within the Marshallese community and employs native Marshallese to assist in communication, which is important in this patient population. Another limitation is that patients could have transferred care or moved out of the area without informing the pharmacy. Both of these limitations could have resulted in low PDC calculations.

Data were not collected on those who received prescriptions in the clinic but never had the medication filled. This would further lower the number of patients who achieved a PDC ≥80% and thus a therapeutic benefit of the medication.

Data on those taking insulin only (n=8) was not evaluated separately. Fear, unfamiliarity with injections, or knowledge of how often a vial of insulin should be replaced may have resulted in a lower PDC.

Despite these limitations that may have contributed to artificially low PDC values, the conclusions gained from this study remain valuable by providing novel insight into this patient population's low medication adherence rate.

Disclosures

The authors have no conflicts of interest to disclose.

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