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RESEARCH

# Evaluation of a pharmacist-managed asthma clinic in an Indian Health Service clinic

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ABSTRACT

*Objectives:* To observe whether American Indian and Alaskan Native (AI/AN) patients at the Yakama Indian Health Service seen at the pharmacist-managed asthma clinic improved asthma outcomes.
*Design:* Retrospective chart review, single group, preintervention and postintervention.
*Setting:* Pharmacist-managed asthma clinic at an Indian Health Service ambulatory care clinic.
*Patients:* Sixty-one AI/AN patients who were seen at least once in the asthma clinic from 2010 to 2014.
*Intervention:* Pharmacist-provided asthma education and medication management.
*Main outcome measures:* Asthma-related hospitalizations and emergency department or urgent care (ED) visits.
*Results:* The total number of asthma-related hospitalizations and ED visits between the 12-month periods preceding and following the initial asthma clinic visit were 11 versus 2 hospitalizations ($P = 0.02$) and 43 versus 25 ED visits ($P = 0.02$), respectively. Over the same period, asthma-related oral corticosteroid use showed a nonsignificant decrease in the number of prescriptions filled (n = 59, $P = 0.08$). In contrast, inhaled corticosteroid prescription fills significantly increased (n = 42, $P = 0.01$).
*Conclusion:* A reduction of asthma-related hospitalizations and ED visits were observed during the course of the intervention. Increased access to formal asthma education and appropriate asthma care benefit the Yakama AI/AN people. A controlled trial is needed to confirm that the intervention causes the intended effect.
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Asthma is a common respiratory disorder characterized by episodes of reversible breathing problems produced by narrowing and obstruction of the airways.[1] The severity of episodes can vary from mild to life threatening. It is estimated that greater than 25 million people in the United States suffer from asthma, with the prevalence increasing every year.[2] American Indian and Alaskan Native (AI/AN) people have a higher prevalence of asthma, with an estimated 10.1% of adults and 15.1% of children compared with the general US population of 7.7% for adults and 9.5% for children.[2-4] The heavy public health burden of asthma affects not only patients and their families, but also society in avoidable hospitalizations, emergency department visits, missed days of school and work, and premature deaths.[1,2]

In recognition of the public health burden of asthma, the US Department of Health and Human Services has identified 8 national objectives to help guide and track efforts in improving asthma outcomes through the Healthy People 2020 program.[5] The first 5 objectives aim at reducing the number of adverse asthma outcomes: death, hospitalization, emergency department visit, activity limitation, and missed school or work days. The next 2 objectives aim at increasing the proportion of asthma patients who receive formal patient education and appropriate asthma care. The last objective is geared toward surveillance at the state level to track asthma cases, illnesses, and disability. One primary method a clinician can contribute

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**Key Points**

**Background:**

- Healthy People 2020 objectives for asthma include increasing the proportion of asthma patients who receive formal asthma education and appropriate care.
- Pharmacists are well positioned to provide disease state and medication education and to optimize medication use in asthma patients.
- Pharmacist-managed asthma education and disease management has not been studied in an American Indian and Alaskan Native (AI/AN) population.

**Findings:**

- The total number of asthma-related hospitalizations and emergency department or urgent care visits decreased in the 12 months following the initial visit in the pharmacist-managed asthma clinic.
- Increased access to formal asthma education and appropriate asthma care benefit the Yakama AI/AN people.

to reduce the 5 adverse asthma outcomes is to increase the proportion of their patients who receive formal asthma education and appropriate asthma care.

A brief review of the progress in achieving the Healthy People 2020 goals shows that although the prevalence of asthma has increased over the last decade, the asthma hospitalization rates have declined for both the general US population and for AI/AN people.[2,6] Asthma-related emergency department (ED) visits, however, have had little to no change over the same period.[2] In 2008, the estimated number of asthma patients who had received formal asthma education was approximately 13%, compared with the Healthy People 2020 goal of 14.5%.[2,5] In addition, in 2008, 33.4% of asthma patients received written asthma management plans from their health care provider, and only 64.8% of asthma patients received education regarding how to recognize early signs and symptoms of an asthma episode or monitoring peak flow results compared with the Healthy People 2020 goals of 36.8% and 68.5%, respectively.[2,5] Consistent with Healthy People 2020 objectives, improved awareness and disease management may help to reduce asthma hospitalizations and emergency department visits further.

Asthma is a condition that is primarily managed with education and medication.[1] Pharmacists are well positioned to provide asthma education and to optimize proper medication prescribing and patient use.[7] Pharmacists in a community setting can fill several voids in the care for asthma patients, including evaluating and improving inhalation technique and discussing the benefits of asthma-control medications.[8,9] Furthermore, pharmacists can contribute to asthma care by performing spirometry services when a respiratory therapist is not available.[10] Although asthma education falls under the practice of pharmacy, it is not common to provide and advertise a pharmacist-managed asthma clinic; this may be due to the lack of reimbursement opportunities, largely owing to the lack of provider-status recognition for pharmacists. Despite this limitation, positive outcomes have been achieved through pharmacist-managed asthma services.[11-14]

Pauley et al.[11] and Sterné et al.[12] showed decreased asthma-related ED visits using a pharmacist as the primary provider to deliver asthma education and medication management in an ambulatory care setting affiliated with a local hospital. Bunting et al.[13] also demonstrated a reduction of asthma-related ED visits and hospitalizations while increasing the proportion of patients with asthma action plans using pharmacists as educators in a pharmacy setting.[13] Pharmacists have also been useful in a multidisciplinary asthma clinic to improve outcomes.[14] Education provided by pharmacists reduces the 5 adverse asthma outcomes outlined in the Healthy People 2020 objectives and can increase the proportion of the asthma patients who receive formal asthma education and appropriate asthma care. However, pharmacist-managed asthma education and disease management has not been studied in an AI/AN population. In this retrospective chart review, we asked whether AI/AN patients who were seen at least once in a pharmacist-managed asthma education clinic would have reduced asthma-related hospitalizations and ED or urgent care visits.

## Objectives

The objective of this project was to assess the asthma-related outcomes of patients who were seen at least once at the pharmacist-managed asthma clinic. The primary outcomes were asthma-related hospitalizations and emergency department (ED) or urgent care visits. The secondary outcomes were the prescription fill history for asthma-related oral corticosteroids (OCS) and for inhaled corticosteroids (ICS), both surrogate markers for asthma control.

## Methods

The Portland Area Indian Health Service (IHS) Institutional Review Board determined this study to be exempt. This retrospective chart review was completed at the Yakama IHS in Toppenish, Washington.

### *Intervention*

The Yakama IHS is an ambulatory care clinic with a walk-in urgent care facility. It is located on the Yakama Reservation with an estimated enrollment of more than 13,000 people. Since September 2010, pharmacists worked as both board-certified asthma educators and providers of asthma care. Native American pediatric and adult patients were referred by their medical provider, most commonly following an asthma-related hospitalization or ED visit. Pharmacists assessed patients with the Asthma Control Test, medical history, and a brief physical examination including auscultation and peak-flow monitoring. Pharmacists had prescriptive authority for asthma care. Pharmacists spent the majority of their time teaching patients about the disease process, correct medication use, and self-management using an asthma action plan.

The asthma clinic was open 1 day each week for 4 hours. There was no spirometry resource available at the asthma clinic.

Referrals were initiated by the primary care provider or the urgent care provider. The clinical pharmacist could also initiate referrals to the pharmacy asthma clinic pending primary care provider approval. All referrals were received, managed, and tracked by the asthma pharmacist. Patients were scheduled for a 60-minute initial appointment with repeat appointments limited to 15-30 minutes each.

With no triage or nursing services, the clinical pharmacist checked and recorded vital signs during each appointment. If the patient was showing signs or symptoms of an acute asthma exacerbation (cyanosis of lips and fingers, difficulty breathing or completing sentences, using accessory muscles to breath), they were referred to the urgent care clinic for acute treatment. A complete patient history of asthma was taken, including the patient's recollection of the number of ED visits or hospitalizations in the past year, number of prednisone bursts for asthma in the past year (verified with patient medication history), asthma triggers, and smoking status. Influenza and pneumonia vaccine status was reviewed and offered to the patient as indicated. The bulk of each appointment consisted of patient education and training in 3 primary areas: asthma disease state, medication information and technique, and self-management.

The key to managing asthma is patient understanding of asthma triggers and the underlying pathology of inflammation and bronchoconstriction. A review of the patients' perceived triggers and other common triggers was discussed with each patient. The medications are discussed with the patient and, in the case of persistent asthma, strong emphasis is made on the differences between controller versus rescue inhalers and the need for daily dosing of the controller.

Finally, during the course of the first visit, the patient's level of asthma control is determined (diagnosis is made by the medical provider) using the guidelines, and appropriate treatment is given using the stepwise approach to managing asthma.[1] The patient is given a personalized asthma action plan, a peak flow meter, and a chart to document daily peak flow results. At subsequent visits, the asthma action plan is reviewed and updated to reflect any change in peak flow.

### *Study design*

A chart review of asthma clinic patients was performed from September 2009 to September 2014. Patient charts were assessed over a 24-month period (12 months preceding and following the initial pharmacy asthma clinic visit) for documentation of asthma-related hospitalizations and ED visits and for prescription fill histories of asthma-related OCS and ICS. The time period selected allowed for seasonal variation in asthma severity. Conditions for hospitalization were met if any of the following occurred: (1) an outside prescription from an asthma-related hospital discharge was filled at the Yakama IHS pharmacy, (2) medical provider documentation of a hospitalization because of asthma, or (3) patient self-reported hospitalization during an asthma clinic visit. An ED visit was recorded in a similar manner as hospitalizations. In addition, an ED visit was included for each walk-in urgent care visit at the Yakama IHS for an asthma exacerbation. The number of asthma-related OCS and ICS prescription fills was totaled during each period.

### *Inclusion criteria*

Charts were included for analysis if there was a diagnosis of asthma with a minimum of 1 pharmacy asthma clinic visit at least 12 months before the time of the chart review. Charts were excluded if the patient was lost to follow-up during the second 12-month period. Only charts eligible for the primary outcomes were considered for the secondary outcomes. For secondary outcomes, charts with a diagnosis other than asthma that required oral corticosteroids (i.e., rheumatoid arthritis) were excluded from the OCS prescription fill history analysis. Furthermore, charts were excluded from the ICS prescription fill history analysis if ICS were not part of the treatment plan at any point during the review period.

### *Data analysis*

Statistical analysis used a 2-tailed paired *t* test to compare the means of all outcomes in the 12-month periods preceding and following the initial visit in the pharmacy asthma clinic. There was one group for analysis without any control comparator. We considered differences significant at $P < 0.05$ with 80% power.

## Results

Table 1 shows the patient demographics and asthma severity classification of those included in the analysis. Sixty-one patient charts met inclusion criteria. The average age was 50.1 years, ranging from 11 to 81 years old. The pharmacy asthma clinic was created in September 2010, and from then until September 2014 there were 142 patients referred with 92 who had at least 1 visit. Thirty-one patients were excluded; 27 patients had the initial visit less than 1 year before the chart review, 3 had no diagnosis of asthma, and 1 moved out of state within 12 months of the initial visit. There were 230 visits by the 61 patients included for analysis during the review period with an average of 3.7 visits per patient. The majority of

**Table 1**
Patient characteristics and asthma severity

| Characteristics | No. patients (%) |
|---|---|
| Sex | 61 |
| Male | 26 (43) |
| Female | 35 (57) |
| Age (y) | |
| <18 | 3 (5) |
| 18-64 | 44 (72) |
| ≥65 | 14 (23) |
| Asthma severity[a] | |
| Intermittent | 12 (20) |
| Mild persistent | 22 (36) |
| Moderate persistent | 21 (34) |
| Severe persistent | 4 (7) |
| Undefined persistent[b] | 2 (3) |

[a] The asthma severity is based on National Asthma Education and Prevention Program Expert Panel Report 3.[1]

[b] Persistent asthma documented by medical provider, but severity not specified.

patients seen in the asthma clinic had mild to moderate persistent asthma. Two patients did not have a specific persistent asthma classification noted in the chart.

Table 2 shows all outcomes data for the 61 patients. The total number of asthma-related hospitalizations and ED visits significantly decreased between the two 12-month periods separated by the initial asthma clinic visit (11 vs. 2 hospitalizations [$P = 0.02$] and 43 vs. 25 ED visits [$P = 0.02$], respectively). Two additional patients were excluded from the asthma-related OCS prescription fill analysis; one had a diagnosis of a kidney transplant and the other had a diagnosis of rheumatoid arthritis, both of which confounded the number and medical purpose of OCS prescriptions. The mean number of OCS prescriptions had a nonsignificant reduction in the period following the initial asthma clinic visit ($P = 0.08$). Forty-two patients were included in the ICS prescription fill analysis. Nineteen of the 61 patients had no ICS as part of the treatment plan at any point during either period. There was a significant increase in the average number of ICS prescription fills in the period following the initial asthma clinic visit ($P = 0.01$).

## Discussion

There was a reduction of asthma-related hospitalizations and ED visits observed for the AI/AN patients who had at least 1 visit at the asthma clinic at Yakama IHS. In the study by Mehal et al., the overall trend for asthma-related hospitalizations among AI/AN has decreased, whereas the number of overall asthma-related ED visits for the US general population has remained largely unchanged.[2,6] To help meet the Healthy People 2020 goals of decreased hospitalizations and ED visits, there needs to be an increased proportion of asthma patients who receive formal asthma education and appropriate asthma care according to current guidelines—two Healthy People 2020 goals themselves.[1,5] The current study supports this argument.

Pharmacists are in an ideal position to increase the proportion of asthma patients who receive formal asthma education and who receive appropriate asthma care. Pharmacists in any patient-care setting can reinforce the importance of controller inhaler therapy and proper inhaler technique at each encounter.[7-9] In the current study, asthma patients who were prescribed an ICS were taught the purpose, proper use, and place in therapy, which in turn may increase ICS use. Pharmacists who have access to prescription fill history have an opportunity to identify those who might not be adherent to ICS therapy. Likewise, a patient not receiving appropriate care could be identified if a patient is filling their rescue inhaler too frequently or habitually receiving OCS prescriptions for asthma attacks. In the current study, there was a nonsignificant reduction of asthma-related OCS prescription use and an increase in ICS prescription adherence. The ICS prescription use increased by 1.5 fills per patient per year to approximately 8 fills per 12 months. Although improved, this number represents adherence only two-thirds of the time. Nevertheless, these outcomes are all markers of improved asthma control.

The biggest challenge in operating the asthma clinic is the high rate of missed appointments. Of the 142 patients referred, 50 were unable to be seen at least once because of a patient missing appointments or the inability to contact a patient. Two common reasons for missed appointments were the lack of transportation on the reservation and the lack of incentive to return once the patient overcame an exacerbation. To help alleviate this challenge, the pharmacist would make frequent reminder and follow-up telephone calls to remind patients of their appointments and to fill their medications.

At the time of this writing, the authors are unaware of any literature that evaluates a pharmacist-managed asthma clinic on hospitalizations and ED visits in an AI/AN population. The AI/AN people, among other racial and ethnic minorities, have historically been underrepresented in the asthma literature. It is known that asthma-related hospitalizations have been trending downward in both the US general population and the AI/AN population[2,6]; however, the national trend for asthma-related ED visits has remained stable.[2] This study observes a reduction in both hospitalizations and ED visits and confirms the results of prior studies.[11-13] The asthma clinic allowed for a greater proportion of asthma patients receive formal asthma education and appropriate asthma care. In addition, the patients who seek care at Yakama IHS could have greater access to routine health care, which could increase access to controller medications. The reduction in hospitalizations and ED visits was statistically significant. Of the 61 patients included, there was a reduction of 9 hospitalizations and 18 ED visits observed, which represents a significant cost savings. Taken in the context that the asthma clinic only operates 1 day per week for 4 hours, the outcomes support the time invested.

## Limitations

There may be possible underreporting of outcomes because outside records were not evaluated. If the patient were to have filled a prescription from an asthma-related hospital or ED discharge at an outside pharmacy, without a follow-up visit at the IHS clinic or mention to the asthma educator, the outcome

**Table 2**
Asthma-related outcomes and prescription fill history over two 12-month periods

| Outcome | 12 mo preceding initial visit | | 12 mo following initial visit | | Paired *t* test |
|---|---|---|---|---|---|
| | No.[a] | Mean ± SD | No.[b] | Mean ± SD | *P* value |
| Hospitalization (n = 61)[c] | 11 | 0.18 ± 0.47 | 2 | 0.03 ± 0.18 | 0.019[d] |
| Emergency department or urgent care visit (n = 61)[c] | 43 | 0.70 ± 1.07 | 25 | 0.41 ± 0.72 | 0.023[d] |
| Oral corticosteroid prescription fill (n = 59)[e] | 77 | 1.31 ± 1.64 | 58 | 0.98 ± 1.72 | 0.087 |
| Inhaled corticosteroid prescription fill (n = 42)[e] | 276 | 6.57 ± 3.81 | 335 | 7.98 ± 2.99 | 0.012[d] |

[a] Total number of outcomes that occurred during this 12 month period listed by row.
[b] Total number of outcomes during the second 12 month period.
[c] Primary outcome.
[d] Significant change from the 12 months preceding initial visit to 12 months following initial visit.
[e] Secondary outcome; number out of 61 charts eligible; additional exclusionary criteria apply.

would have been missed. These limitations, however, apply equally to both periods and should not threaten internal validity. Another limitation is the lack of a control group. Without a control group, the outcomes should only be interpreted as observational as one cannot say the intervention caused the outcomes.

The inclusion criteria allowed only those who had 12 months of data both before and after the initial visit to the asthma clinic. Although some of those who were lost to follow-up moved, many had transportation issues or did not have a valid phone number to contact the patient. Those who were lost to follow-up were not included in the results and may have been less healthy than those who followed, which could overestimate the intervention effect of the entire clinic population. Furthermore, of the 61 patients who were included in the study, some were excluded in the secondary outcomes of ICS and OCS prescription fill rates. Likewise, those who were excluded could have been less healthy, which might have underestimated the effect for the secondary outcomes of the entire clinic population. The exclusions were necessary, however, as there was not a reliable way to count asthma-related OCS prescription use if a patient had indications for non-asthma OCS use. In addition, if an ICS was not part of the treatment plan, it would be unfair to count the portion of time that an ICS was not prescribed as nonadherent.

## Conclusion

The number of asthma-related hospitalizations and ED visits were reduced in the 12 months following at least one visit at the pharmacist-managed asthma clinic. Increased access to formal asthma education and appropriate asthma care benefit the Yakama AI/AN people. A controlled study is needed to determine a cause-and-effect relationship.

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