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Utilization of Asthma Guidelines in Primary Care

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Abstract

Background: Chronic lower respiratory disease, including asthma, is the fourth leading cause of death in the U.S. Financially, asthma accounts for approximately 54 billion dollars in healthcare spending annually. The National Heart Lung and Blood Institute [NHLBI] established guidelines to reduce impairment and to reduce future asthma attacks.

Purpose: This Quality Improvement (QI) pilot implemented the Asthma Control Test (ACT) and the Asthma Action Plan (AAP) per NHLBI guidelines. This project aimed to increase provider use of the ACT and AAP to 50% in patients with a diagnosis of asthma over one month.

Methods: A convenience sample of six adult patients ages 18-64 years with a diagnosis of asthma from a primary care office in a large suburban county in the Midwest were included. During a scheduled office visit, participants completed the ACT. Based on the ACT score, the provider customized an AAP for at-home use. The patient was contacted two weeks following the office visit to reassess the ACT score.

Results: Use of the ACT and AAP by providers increased to 75%. The mean ACT baseline score was 15.3 indicative of asthma not well controlled. Follow-up ACT score mean was 19 indicating well-controlled asthma.

Implications: The National Heart Lung Blood Institute recommends an annual assessment of asthma control with the Asthma Control Test and an individualized Asthma Action Plan. This project suggests clinical benefit for improving control of asthma symptoms. Further evaluation is required.

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More than 25 million people living in the United States have an asthma diagnosis. Of this group, approximately 19 million of these individuals are adults (Faststats, 2020). In 2017, chronic lower respiratory disease ranked fourth as a cause of death nationally. Chronic lower respiratory disease includes bronchitis, emphysema, and asthma. In 2018, approximately 3,440 deaths were directly attributed to asthma (Faststats, 2020).

Asthma is a chronic lung disease that causes inflammation and stenosis of the airways (Asthma, 2014). Symptoms of asthma include wheezing, chest tightness, shortness of breath, and nighttime coughing (Asthma, 2014). These symptoms are usually exacerbated by triggers such as pollen, mold, animal dander, dust, air pollution, cigarette smoke, and respiratory infections, which can all induce asthma symptoms (Asthma, 2014).

Annual direct healthcare cost of asthma in the United States in 2018 was approximately 54 billion dollars (American Lung Association, 2020). Nationally, costs associated with asthma include direct medical costs of 50.3 billion dollars along with lost productivity of approximately three billion dollars due to absenteeism and disability. Asthma care includes prescriptions, office visits, ED visits, and hospitalizations where the average cost of asthma care is approximately $3,300 per person.

The National Heart Lung and Blood Institute [NHLBI] established guidelines in 2007 for asthma management. The focus of care is to reduce impairment caused by the frequency and intensity of symptoms and, secondly, reduce the risk for the likelihood of future asthma attacks. Meeting these goals requires an ongoing partnership between the patient and his/her healthcare provider. Achieving asthma control requires the patient having access to and taking the appropriate medications, addressing environmental

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factors that cause worsening symptoms, helping patients learn self-management skills, and monitoring over the long term to assess asthma control and adjust therapy accordingly (NHLBI, 2007). Treatment regimens emphasize prevention rather than symptom relief; the goal of asthma control is no asthma symptoms, no nocturnal waking, no limitations to normal activities, and no rescue medications used (Cornforth, 2015). An ever-present obstacle in clinical management of asthma is the failure to avert and/or effectively treat uncontrolled symptoms when they first occur (Rance, 2016).

Cornforth (2015) recommends structured asthma reviews be carried out at least annually in primary care and personalized asthma action plans implemented for all patients. Despite these recommendations, the Asthma Control Test (ACT) and the Asthma Action Plan (AAP) are not commonly used in the adult primary care setting (Rance, 2016). A qualitative study sought to gain insight into possible barriers to provider use of the ACT and AAP (Ring, 2015). Four barriers preventing consistent use by providers were identified including AAP was not customizable to the patient due to use of a generic prefilled form; difficulty in locating previous ACT and AAP in the patient record when an Electronic Health Record [EHR] was not used; lack of time during an office visit to complete documentation; and ACT and AAP not supported in the current clinical setting by all providers in the practice.

The NHLBI (2007) recommends asthma control be assessed by a valid patient questionnaire. The ACT developed by Nathan et al. (2003) uses patient self-report to assess asthma control. The ACT is a reliable and valid five-question self-administered questionnaire used to elicit a four-week recall of symptoms and is responsive to changes over time. These subjective responses are translated into a score to identify if the

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patient’s asthma is well controlled, not well controlled, or poorly controlled (Rance, 2016). The patient's score from the ACT is used to determine asthma severity and guide an individualized treatment regimen.

The NHLBI additionally recommends use of an Asthma Action Plan (AAP) for asthma symptom management in the proposed guidelines. The AAP is a set of instructions for daily management tailored to the individual patient empowering patients and improve adherence to treatment (Hoy & O’Keefe, 2015). The purpose of the AAP is to serve as a guide to managing and maintaining asthma control outside the clinical setting. The AAP is designed in a stoplight format: green, yellow, and red to denote symptom severity. green zone describes acceptable control; yellow zone details loss of control and instructions for intensifying therapy; and red zone indicates severe symptoms that require urgent medical attention (Kouri, Kaplan, Boulet, & Gupta, 2019). Patients correlate their symptoms with the corresponding color and follow the prescribed treatment outlined on their plan. AAP should be a central component of any asthma treatment and education plan. Benefits from use of an AAP with patients with asthma include improved control of asthma symptoms, fewer exacerbations, and fewer acute care visits decreasing healthcare spending. Kuhn et al. (2015) found a 41% decrease in outpatient oral steroid use, and a 34% reduction in asthma exacerbations three months following AAP implementation. Use of AAP was shown to significantly reduce asthma morbidity and need for acute treatment and hospital admission (Cornforth, 2015).

The purpose of this QI project was to implement use of the ACT and AAP in the primary care setting based on the NHLBI guidelines for asthma care. This project aimed to increase provider use of the ACT and AAP to 50% in patients with a diagnosis of

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asthma over one month. The primary outcome measure was rate of provider completion of the ACT and AAP. The secondary project outcome measure was rate of change between patients' baseline ACT and follow-up ACT. The question asked in this project was: in patients ages 18-64 years with a diagnosis of asthma, how does implementation of the AAP interact with patient self-report of symptoms on the ACT as assessed after two weeks of AAP at home use?

Review of the Literature

A systematic search of CINAHL, Medline, PubMed, and Cochrane Collection databases was conducted to review current literature regarding asthma guideline use in primary care. The search was limited to the year 2010 to present. MESH and key terms were included in the search string: *primary care* and *Asthma Action Plan, primary care* and *Asthma Control Test, asthma guidelines* and *asthma treatment plan.* Inclusion criteria were set to include patients with a diagnosis of asthma, use of the Asthma Control Test, and use of an Asthma Action Plan. Search results returned 34 articles. Results that included pediatric subjects, other methods for assessing patient-reported asthma symptom control, or education without use of an AAP were excluded. After accounting for duplicate articles and inclusion/exclusion criteria, 12 articles remained.

The work surrounding use of the ACT and AAP is to change attitudes and perceptions of value by providers and patients. Bundy and Murphy (2014) conducted a quality improvement project in a primary care setting improving provider understanding, support, and use of the ACT and AAP when providing asthma care. After provider education, followed by stakeholder adoption and stakeholder investment, provider compliance increased from 30% to 78.6% ($p < 0.001$). Kaferle and Wimsatt (2012) found

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similar compliance success in use of the ACT and AAP to 72% from 20% with ongoing provider engagement and education.

The primary care setting is the optimal opportunity to successfully treat and manage asthma. The literature suggests adherence to asthma guidelines by providers is poor in part because of the complexity and length of the guidelines that includes details related to variations in treatment based on patient idiosyncrasies such as age, severity level, and medication regimen (Kuhn et al., 2015). To improve use of guidelines by providers, the NHLBI (2012) condensed recommendations to a 12-page Asthma Quick Care Reference. This guide uses a stepwise flow chart based on asthma severity scores from the ACT. Kocks, Seys, van Duin, Diamant, & Tsiligianni (2018) tested the ACT for validity, reliability, suitability, and ease of use of various asthma questionnaires. The authors determined the ACT to be best suited for use in the primary care setting when compared to other asthma questionnaires. Use of the AAP in the primary care setting provides multiple benefits. However, there is considerable, long-standing evidence indicating AAP implementation and review by healthcare professionals as well as use by patients is suboptimal. Therefore, this lackluster use of guidelines needs to be improved if any clinical benefits of the guidelines are to be maximized (Ring et al., 2015). Consistent use of an AAP includes two other intervention benefits: ongoing asthma education and regular follow-up (Kouri et al., 2019).

Patient self-report of symptoms is invaluable in guiding patient treatment. Patient-reported outcome measures are short, self-completed questionnaires commonly used to measure a patient's health status or Health-Related Quality of Life (HRQL) before and after an intervention (Worth et al., 2014). The ACT is a five-question reliable and valid

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tool that elicits a four-week recall of the patient's asthma symptoms (Rance, 2016). Based on the score from the ACT, the patient's asthma is classified as well-controlled, not well controlled, or poorly controlled. Patient-reported outcomes focus on disease burden or the impact of diseases on patients tailoring asthma care to their individual asthma experience (Kocks et al., 2018). The NHLBI guidelines utilize a stepwise approach to treatment based on the ACT score. This individualizes treatment to the patient's symptoms.

The AAP provides the patient with tools and resources for effective self-management outside of the clinical setting. The AAP stoplight format emphasizes the yellow zone (YZ) as a high-risk zone signifying the beginning of a loss of control of asthma symptoms. The YZ practice parameter details loss of control as an increase in asthma symptoms, increased use of reliever medications beyond prescribed dose, a decrease in peak expiratory flow rate, and the presence of or increase in nocturnal symptoms and to escalate asthma therapy when there is a loss of asthma control (Dinaker et al., 2016). If not properly managed, YZ symptoms can progress to red zone symptoms and require emergent medical intervention. Providing instruction on how to recognize the loss of symptom control and activating a YZ intervention is essential (Rance, 2016).

Evaluation studies demonstrate patients receiving an AAP as part of their self-management education had higher satisfaction with their care, increased medication adherence, and fewer acute care visits compared with patients with no AAP (Kuhn et al, 2015). According to Pinnock and Thomas (2014), in the context of asthma, the importance of being confident to deal with medical management is central to regaining control in the event of deteriorating symptoms to prevent potentially severe exacerbations

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and hospital admission. Giving patients the ability to recognize early symptoms of loss of control and how and when to take appropriate action including adjusting current treatment, advancing to emergency treatment, or seeking timely professional intervention is paramount to asthma self-management. The AAP provides patients with tools and resources for effective self-management outside of the clinical setting, preventing the need for the escalation of care.

This QI project utilized the Plan Do Study Act (PDSA) framework to address utilization of the NHLBI guidelines for asthma care by implementing use of the ACT and AAP in adult patients with a diagnosis of asthma. The PDSA framework guides in understanding the project pathway, when to review, and how to apply guidelines to make changes in the project (Hickey and Brosnan, 2017). The PDSA cycle allows for a succinct and orderly method for implementing QI projects. Steps to identifying a problem, developing an evidence-based intervention, evaluating findings, and modifying next steps for an effective follow-up cycle make the PDSA an effective framework for quality improvement.

Methods

Design

This QI project was a pilot study utilizing an observational descriptive design to improve provider adherence to NHLBI guidelines for asthma. The project trained providers on ACT and AAP for use in the primary care setting. Participant's baseline ACT scores were assessed. The AAP was introduced and follow up ACT scores were collected two weeks later via telephone by office staff.

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Setting

The project took place in the primary care setting located in Midwest suburban area, with services offered by ten primary care providers and two advanced practice providers (APP). The office manages adult patients ages 18 years throughout the lifespan. Patient demographics for the clinic include lower to middle socio-economic class adults of Black, Caucasian, Hispanic, and Asian ethnic backgrounds. Three providers, namely one physician and two nurse practitioners, participated in project implementation.

Sample

A convenience sample of established adult patients in the practice ages 18-64 years with a diagnosis of asthma scheduled for an office visit from October 12 through October 26, 2020, was included in the project. Eight patients were eligible for participation; six patients participated. Exclusion criteria were adults over the age of 64 years and patients with a history of SARS-COV2.

Procedures

A team of stakeholders addressed barriers to use of recommended NHLBI guidelines for ACT and AAP use with asthma patients. The AAP was added to the Electronic Health Record (EHR) to avoid disruption to current workflow. Participating providers received training on both the ACT and AAP. Asthma patients with scheduled appointments were provided with the ACT during their intake with the Medical Assistant (MA). The provider scored the ACT and developed an individualized AAP for the patient. The patient received education on his/her AAP and provided with a copy for home use. Patients were contacted two weeks later via telephone by office staff to reassess ACT scores.

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Data Collection

Following project approval, data collection began in October 2020. Patients were approached during a scheduled office visit by office staff regarding the purpose, aim, and outcomes of the project. Participants completed a demographic data collection sheet to provide personal data including age, gender, race, and zip code. Next, participants were administered an ACT, and asthma severity was determined based on the ACT score. The provider then developed a patient-specific AAP. Participants were contacted by office staff two weeks later via telephone to reassess ACT scores. ACT scores were recorded on a data collection sheet and compared to baseline to determine rate of change in ACT scores from baseline to follow-up. Data regarding provider completion of ACT and AAP were recorded. Office staff shared ACT scores and AAP completion with the primary investigator.

Data Analysis

Demographic data were analyzed using descriptive statistics. Based on the small sample size (n=6), the data did not meet the assumptions for statistical analysis. A larger sample size could improve effect size and paired samples t-test would likely be appropriate to compare baseline and follow-up scores on the ACT.

Approval Process

Formal, written approval was obtained from administration at the healthcare organization. Written approval from The University of Missouri-St. Louis Institutional Review Board (IRB) was obtained on September 21, 2020. There were no known ethical concerns. Benefits of this project include an increase in use of the ACT and AAP in primary care.

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Results

Of the six participants, all were females (*n*=6). Age of participants ranged from 26 to 63 years with a mean (*m*) of 43.8 years, 12.13 SD. All participants were African American. Baseline ACT scores ranged from 9 to 21 with a mean (*m*) ACT score of 15.3, which is an indication of asthma not well controlled. Following administration of the ACT, all participants were provided with a customized AAP for home use. The two-week follow-up ACT included results from three participants. Three participants were unavailable for follow-up testing. Follow up ACT scores ranged from 15-22 with a mean score of 19 indicating asthma that is well controlled. Changes in ACT score between baseline and follow up showed minor change (Figure 1).

Before implementation, ACT and AAP were not used by providers in the clinic. Of the eight patients eligible to participate, six were included in the project. Data reflect a 75% increase in provider use of the ACT and AAP in patients with a diagnosis of asthma.

Discussion

The purpose of this QI pilot initiative was to introduce NHLBI asthma guidelines in a primary care setting. The pilot implemented the Asthma Control Test (ACT) and the Asthma Action Plan (AAP) in a primary care setting per NHLBI guidelines. This project aimed to increase provider use of the ACT and AAP to 50% over a one-month time frame. During the implementation phase, eight asthma patients had scheduled appointments, and six were included for participation. Possible barriers related to incorporating use of the ACT and AAP by healthcare providers in management of patients with asthma require ongoing evaluation.

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Recommendations for future study include addressing study limitations of time constraints and sample size. Increased sample size to a minimum of 30 patients to determine if a relationship exists between AAP use and ACT scores. Increased sample size may also address sample bias present due to lack of variation in race and gender of participants. Increasing length of time in the implementation phase of the project may better assess change in ACT score over time. To correctly administer the ACT, the test measures recall of symptoms over a four-week time frame (Nathan et al., 2003). Notably, data for this project were collected over one month with follow-up ACT being administered two weeks after the baseline ACT.

Recommendations for future practice include extending the requirement of ACT and AAP use to all providers in the clinic setting. Secondly, the ACT should be administered to patients at least annually to assess asthma symptom control to note changes and adjust therapy in the patient's AAP accordingly. This could automatically reinforce annual AAP review by providers.

Lastly, the ACT quantifies patient self-report of asthma symptoms into a numerical value. The score is then correlated with an asthma severity level. The ACT is an entirely subjective measure of asthma severity, which may introduce reporting bias. However, peak flow reading is an objective clinical tool used to determine lung function. This reading is also used to direct treatment on the patient's AAP. Providing subjective and objective findings may provide a well-rounded asthma evaluation.

The ACT and AAP are demonstrated effective and reliable tools for asthma management using NHLBI guidelines. According to the John Kotter 8-step process for leading change, the first step is to create a sense of urgency surrounding the use of ACT

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and AAP (Kotter, 1996). The sense of urgency is created through the dissemination of findings from this pilot project and benefits in asthma management to providers in the health organization through newsletters, flyers, and staff meetings. Conducting ongoing education and training to maintain familiarity with both the ACT and AAP are imperative to maintenance of change. Secondly, continued efforts to build a coalition for change with support from key stakeholders including key providers in the clinic, support staff, and continued patient partnership for improving asthma care.

Conclusion

The pilot project was initiated to improve use of the ACT and AAP for asthma care in a primary care setting. It was determined before project implementation ACT and AAP were not in use in this clinic setting. Following implementation, ACT and AAP provider usage increased to 75% adherence. Addressing barriers before full-scale implementation is beneficial in achieving and maintaining full adherence to the ACT and AAP. Based on the findings of this project, further evaluation is required to determine statistical significance and clinical benefit of the AAP on patient self-report of asthma symptoms on the ACT. Despite the small sample size, clinical positive trends were noted with patients showing an increase in follow-up ACT scores.

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Asthma Control Test

Patient's Name:_____ Today's Date:_____

Asthma Control Test™ (ACT) is:

- A quick test that provides a numerical score to assess asthma control.
- Recognized by the National Institutes of Health (NIH) in its 2007 asthma guidelines.[1]
- Clinically validated against spirometry and specialist assessment.[2]

PATIENTS:
1. Answer each question and write the answer number in the box to the right of each question.
2. Add your answers and write your total score in the TOTAL box shown below.
3. Discuss your results with your doctor.

									SCORE
1. In the past **4 weeks**, how much of the time did your **asthma** keep you from getting as much done at work, school or at home?	All of the time	1	Most of the time	2	Some of the time	3	A little of the time	4	None of the time 5	
2. During the past **4 weeks**, how often have you had shortness of breath?	More than once a day	1	Once a day	2	3 to 6 times a week	3	Once or twice a week	4	Not at all 5	
3. During the past **4 weeks**, how often did your **asthma** symptoms (wheezing, coughing, shortness of breath, chest tightness or pain) wake you up at night or earlier than usual in the morning?	4 or more nights a week	1	2 or 3 nights a week	2	Once a week	3	Once or twice	4	Not at all 5	
4. During the past **4 weeks**, how often have you used your rescue inhaler or nebulizer medication (such as albuterol)?	3 or more times per day	1	1 or 2 times per day	2	2 or 3 times per week	3	Once a week or less	4	Not at all 5	
5. How would you rate your **asthma** control during the **past 4 weeks**?	Not controlled at all	1	Poorly controlled	2	Somewhat controlled	3	Well controlled	4	Completely controlled 5	
									TOTAL	

If your score is 19 or less, your asthma may not be under control.

The Asthma Control Test is for people with asthma 12 years and older.

HEALTHCARE PROVIDER:

- Include the ACT score in your patient's chart to track asthma control.

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Table 1

Pre and post ACT scores

Variable	*n*	%	Mean	SD	Min	Max
Baseline	6	100	15.3	4.85	8	21
Post-test	3	50	19	4.35	14	22

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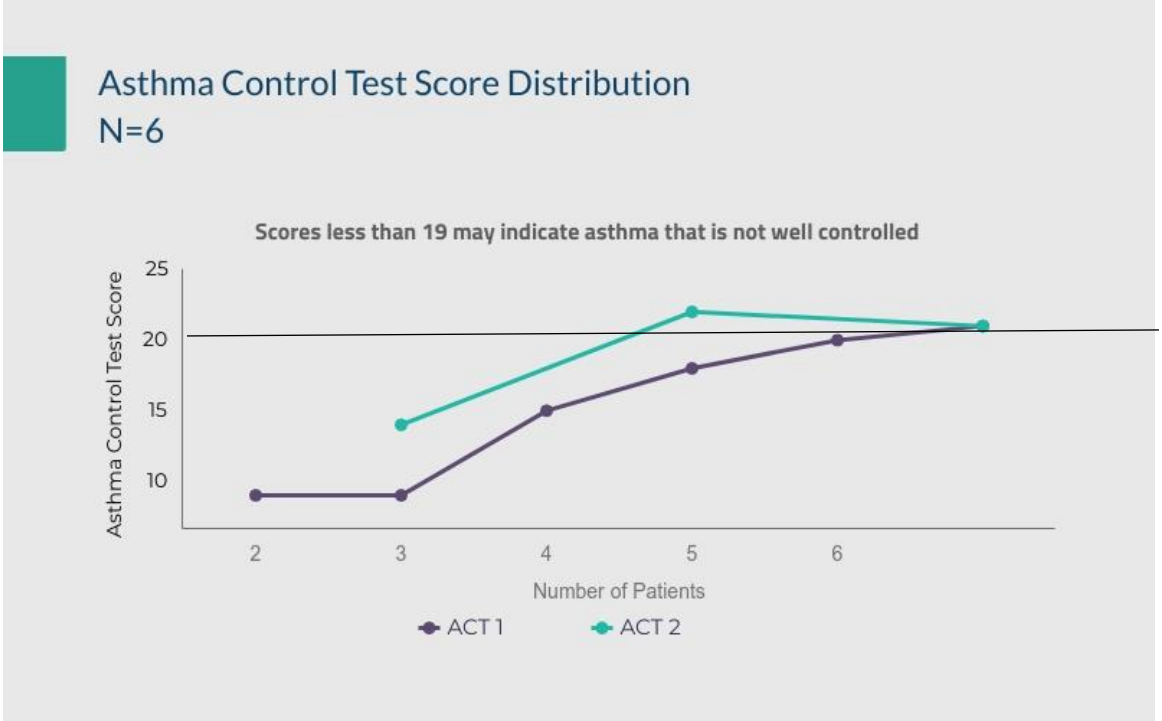
Figure 1

Distribution of baseline and follow up ACT scores



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