

Asthma Clinical Excellence – A Quality Improvement Project

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ABSTRACT

Purpose: Improper management of asthma leads to poor patient outcomes and increases in both costs and resources. This study aims to increase provider adherence to asthma clinical practice guidelines.

Methods: A multifaceted intervention was utilized that included educational sessions for providers, adjustments to the electronic health record (EHR), access to toolkits, and workflow changes. Pediatric patients aged 5-18 years and diagnosed with asthma ($N = 173$) were evaluated using a pre-post design. Provider adherence to key components of clinical practice guidelines were assessed prior to implementation, and a three and six months post-implementation. Data was analyzed using descriptive statistics and the Friedman's ANOVA by rank.

Results: Provider education, EHR adjustments, provider toolkits, and changes to office workflow improved provider adherence to key aspects of asthma clinical practice guidelines. A significant difference was found between the pre and post implementation groups ($p < .01$).

Conclusion: Increased adherence to clinical practice guidelines leads to fewer complications and an overall improved

quality of life. Continuing provider education is critical to sustained adherence.

KEY WORDS

Accountable care organization, asthma, clinical practice guidelines, pediatrics, primary care providers

INTRODUCTION

Clinical practice guidelines are a mainstay in today's healthcare system. Guidelines are widely used by pediatric healthcare providers to manage both chronic and acute problems. Although the majority of primary care providers are aware of clinical practice guidelines, most of them do not successfully utilize them in the treatment and management of their patients (Kang et al., 2010). 6.5 million children in the United States have asthma making this one of the most common diseases that pediatric primary care providers encounter (Liu et al., 2010). The successful utilization of national asthma guidelines leads to reduced asthma morbidity (Yawn et al., 2016).

BACKGROUND & SIGNIFICANCE

Only one-third of children with asthma are classified as well-controlled (Gold et al., 2012). These children experience more asthma exacerbations, emergency department (ED)/urgent care visits, hospitalization, limitations on activities, increased use of medications, more missed school days, and more missed days of work for caregivers than children with well-controlled asthma (Gold et al., 2012; Liu et al., 2010). Uncontrolled asthma interferes with sports, physical exertion, recreational activities, and sleep; all of which are highly

important to childhood development and health maintenance.

National Guidelines

The National Heart, Lung, and Blood Institute in collaboration with the National Asthma Education and Prevention Program created the “Expert Panel Report 3: Guidelines for the Diagnosis and Management of Asthma.” These clinical practice guidelines are widely recognized and considered the “gold standard” in the management of patients with asthma (O’Laughlen, Hollen, & Ting, 2009). These guidelines support practitioners in implementing the most evidence-based care, improving patient outcomes, standardizing care, and decreasing variations in health (O’Laughlen et al., 2009). The goal of these guidelines is to close the gap between current knowledge and practice implementation (National Heart, Lung, and Blood Institute, 2007).

Internal Evidence

A large accountable care organization in a metropolitan area of Arizona prides itself on the importance of high-quality care and improving patient outcomes. In this family practice clinic, patients with asthma were not being properly diagnosed, managed, and treated. Patients were lacking key aspects of the EPR-3 guidelines. After a review of their current processes and procedures, it was determined that there was a critical need for evidence-based care.

PROBLEM STATEMENT

In children, asthma is the third most frequent cause of hospitalization (Loftus & Wise, 2015). 46% of US children with asthma are classified as uncontrolled (Liu et al., 2010). Pediatric asthma accounts for 750,000 ED visits, 7 million outpatient visits, 198,000 inpatient hospitalizations, 12.8 million missed school days, and more than 150 deaths every year (Liu et al., 2010). Asthma related

expenses are estimated to be around \$56 billion annually (Loftus & Wise, 2015).

Asthma control is an important indicator of proper disease management and should be assessed on a regular basis at every primary care visit. Children with uncontrolled asthma have a higher rate of overall disease burden, utilize significantly more healthcare resources, and experience more adverse outcomes than those that are considered well-controlled (Gold et al., 2012; Liu et al., 2010) Asthma is a major consumer of valuable healthcare resources.

Providers are not given the proper tools to follow clinical practice guidelines. Not utilizing asthma guidelines leads to poor health outcomes and substandard care (Okelo et al., 2013). This important discovery lead to the clinical question: In children ages 5-18 with asthma, how does the use of asthma clinical practice guidelines compared to standard care influence patient outcomes at three and six months?

PURPOSE & RATIONALE

The purpose of this project is to improve provider adherence to asthma clinical practice guidelines and improve patient outcomes. Current literature suggests that the implementation of asthma practice guidelines results in decreased asthma morbidity (Yawn et al., 2016). Current guidelines are rigorous in their approach and offer valuable data and high-quality recommendations (Becker, 2012). Implementation of the EPR-3 guidelines and updates to the EHR via a quality improvement project improves provider adherence to national guidelines (Lee, Gogo, Tancredi, Garcia, & Shaikh, 2016). By continuing provider education about the assessment, classification, and management of asthma, not only will patients benefit but the US healthcare system will experience a significant reduction in the burden and cost of asthma care (Gold et al., 2012).

SEARCH STRATEGY

An electronic literature search was performed. The databases searched included the Cumulative Index of Nursing and Allied Health Literature (CINAHL), The Cochrane Library, and PubMed. The terms utilized in the search included: *asthma, clinical practice guidelines, children OR pediatrics OR school aged OR adolescents OR kids, and patient outcomes OR asthma control*. Results were restricted to articles published between the years of 2012 and 2017. Articles were excluded if they were more than five years old or only pertained to adult patients. The PubMed search revealed 166 articles and the CINAHL search revealed 22 results. A Cochrane Library search did not yield any relevant articles. Results were screened for relevance and quality. Their reference lists were also reviewed for relevant articles. A total of eleven articles were selected. These articles were critically appraised and the best articles with the highest level of evidence were included in a literature review.

EVIDENCE SYNTHESIS

The synthesis of the evidence suggests that multiple interventions are necessary to improve patient outcomes and improve provider adherence to asthma guidelines. Multiple interventions including provider education, provider toolkits, pharmacology support, patient education, and adjustments to the EHR are the cornerstone for improving patient outcomes and provider adherence to clinical practice guidelines (Okelo et al., 2013; Zeiger et al., 2012). These programs improve level of asthma control, level of asthma severity, use of medications according to EPR-3 guidelines, use of the Asthma Action Plan and Asthma Control Test, and improve overall asthma management (Cicutto et al., 2014; Dexheimer et al., 2014; Lee et al., 2016).

They also decrease the number of ED and urgent care visits as well as the number of asthma exacerbations (Mold et al., 2014; Zeiger et al., 2012).

CONCEPTUAL FRAMEWORK AND EVIDENCE BASED PRACTICE MODEL

The Chronic Care Model

This framework is used to improve the care and management of chronic illness. It is composed of six elements: healthcare organizations, community resources, clinical information systems, clinical decision support, delivery system design, and self-management support (Adams & Woods, 2016). All of these domains overlap requiring that the medical team interact with the community, the healthcare system, public and private policies, as well as the patient (Adams & Woods, 2016). This conceptual framework provides a systematic way of understanding and managing chronic illness. Implementation of asthma practice guidelines requires collaboration among the domains of the Chronic Care Model.

The Iowa Model of Evidence-Based Practice

The Iowa Model provides a guide for taking a clinical problem, developing an intervention, and making an organizational change (White & Spruce, 2015). The goal of this framework is to enhance practice and improve patient outcomes. The Iowa Model stimulates quality-improvement measures providing a framework for the improvement of patient outcomes through the use of national guidelines. It provides a stepwise approach with an intuitive structure for implementation and considers the entire healthcare system. This model was chosen because it has clearly identified steps and provides a feasible algorithm to implement practice change.

METHODS

Setting & Participants

This study took place at a family medicine clinic in a metropolitan area of Arizona that is part of an accountable care organization. The clinic is staffed by attending physicians, family medicine residents, and one family nurse practitioner. There were multiple stakeholders in this project including: providers, patients, medical assistants, front office staff members, and organizational leadership. The population included pediatric patients with a diagnosis of asthma aged 5-18 years. All patients meeting the above criteria were included in the study if they were seen between January-November 2017 ($N = 173$). Participants were excluded if they were less than five years-old, over 18 years-old, or had other co-morbid conditions including: chronic lung disease, cystic fibrosis, congenital heart disease, bronchiolitis, tracheostomy, or a neurological disorder.

Procedures

An interdisciplinary team was established to develop, guide, and implement an asthma quality improvement project. A multifactorial approach to implement the EPR-3 guidelines into clinical practice was created. This approach included provider education, provider toolkits, adjustments to the EHR, and changes to office workflow.

Two provider education sessions were held that included all medical assistants, residents, and attending physicians. The sessions included information on the project, a review of asthma care, and an introduction of the EPR-3 guidelines. Provider toolkits consisted of a "Quick Reference Guide" to the EPR-3 guidelines, diagnosis and management strategies, information on medication use, and a flowsheet for asthma classification. An updated asthma note replaced the existing note in the EHR. The adjustments were made with feedback from the staff and included key aspects of the EPR-3 guidelines. The new asthma note included

prompts for providers and reflected proper assessment and management. Office workflow was adjusted to include the use of an asthma intake note by the medical assistant. This intake note was provided to the patient or the legal guardian to fill out prior to being seen by the provider. The intake note provided the clinician with key information about the classification and current level of asthma control. It also prompted the medical assistant to ask specific questions and utilize certain screening tools.

Arizona State University Institutional Review Board approval was obtained. Data was de-identified prior to analysis.

Outcomes were assessed from the EHR prior to implementation (January-May 2017) ($n = 75$). Three-months post-implementation (May-August 2017) ($n = 36$), and six-months post-implementation (August-November 2017) ($n = 62$).

Outcome Measures

Multiple measures were assessed including: number of patients with asthma, classification of asthma, number of primary care appointments in 2017, use of a controller medication, presence of an Asthma Action plan, use of spirometry, presence of an Asthma Control Test, number of patients vaccinated for influenza, and number of patients screened for tobacco and exposure to secondhand smoke.

Data Collection & Analysis

Data was pulled from the EHR by a quality improvement team at the organization. De-identified data was used for the purpose of this project. SPSS was used to store, manage, and analyze the data. Descriptive statistics were used to describe the sample and outcome variables. Inferential statistics were used to analyze the data. The Friedman's ANOVA by rank was used and the critical value was set at $p < .05$.

RESULTS

The age and number of primary care provider appointments by subgroup are displayed in Table 1. The population consisted of three subgroups, pre-intervention ($n = 75$), three-month post-intervention ($n = 36$), and six-months post-intervention ($n = 62$). The average age of the children was 12.8 years old ($SD = 3.80$) and the ages ranged from 5-18 years old. The average number of primary care appointments per patient in 2017 was 1.27 ($SD = 0.68$) and the number of appointments ranged from 1-5.

An analysis of asthma classification showed that the majority of patients were classified as having mild asthma. Asthma severity was classified as persistent (24%), intermittent (22%), mild (32%), moderate (13%), severe (1%), or exercise induced (8%) (see table 2).

Use of a controller medication, presence of an Asthma Action Plan, Spirometry, an Asthma Control Test, screening for secondhand smoke, a tobacco use assessment, and the presence of an influenza vaccine are indicative of proper asthma diagnosis and management. The percent of patients using a controller medication decreased from 89.5% to 76.9% and finally increased to 100%. The percent of patients with an Asthma Action Plan in place initially decreased from 5.3% to 2.8% but ultimately increased to a total of 8.1%. The percentage of patients that had spirometry performed was 4% in the pre-implementation group but increased to 5.6% after three months and 6.5% after six months. The percent of participants that had an Asthma Control Test administered increased slightly from 4% to 5.6% and then substantially increased after six-months to 12.9%. The number of patients who were screened for exposure to secondhand smoke initially increased from 4% to 5.6% and then decreased to 3.2%. The percent of patients

that had an influenza vaccine initially decreased from 13.3% to 11.1% and then increased after six months to 30.6%. The number of patients with a tobacco use assessment performed was 66.7% prior to implementation. They increased to 68% three months post-implementation and decreased to 60.5% six months post-implementation (see table 2).

A Friedman's ANOVA by rank was conducted comparing the multiple outcome measures. The outcome measures were compared prior to implementation of the multifactorial intervention, three months post-intervention, and six months post-intervention. A significant difference was found ($\chi^2(2) = 177.20, p < .01$). Provider education, provider toolkits, EHR changes, and improvements in office workflow significantly affect key indicators of proper asthma management and improve provider adherence to asthma clinical practice guidelines.

DISCUSSION

Overall, this study was able to improve provider understanding of EPR-3 guidelines and improve overall asthma management. There was a substantial increase in provider adherence to the national guidelines. Proper asthma management leads to fewer complications, long-term consequences, and an overall improved quality of life.

Improving provider adherence to asthma clinical practice guidelines requires the collaboration of leadership, providers, support staff, and patients. This study has important implications for providers caring for children with asthma or other chronic illnesses.

This study had several limitations. Patient adherence to medication regimens and prescribed therapies was not assessed. Current literature suggests utilizing patient education as a modality to improve provider adherence to EPR-3 guidelines. Patient

education was not part of our multifaceted intervention. Due to the way data was pulled from the EHR we were unable to assess if asthma severity improved throughout the time frame. New support staff hired within the intervention time period were not properly trained on the implementation or administration of key aspects of the EPR-3 guidelines or the project.

Despite these limitations, this study had many strengths and is applicable to clinical practice. The sample size was relatively large and patient outcomes were able to be analyzed over several months to determine the true effect of the intervention.

The findings in this study are consistent with the findings of the literature search that was performed. More studies are needed to determine the link between asthma clinical practice guidelines and classification of asthma severity.

Improved patient outcomes have the potential to lead to financial benefits for the practice. Reimbursement for care is moving toward being based on the quality of patient outcomes. This could result in more reimbursement and overall financial gain.

This intervention will be sustained through routine educational sessions for providers and support staff. Continuing provider education and ensuring newly hired staff are appropriately trained may result in sustained adherence to EPR-3 guidelines. The results of this project will be disseminated to other entities within the accountable care organization. Expansion of the intervention to other inpatient and outpatient environments will lead to unified asthma care across all settings. This project could be adapted to implement clinical practice guidelines for other common conditions leading to similar patient outcomes.

CONCLUSION

Multifaceted interventions improve provider adherence to evidence-based clinical

practice guidelines. Providers and other staff members gained a better understanding of proper care and management for patients with asthma based on EPR-3 guidelines. Legislation is progressing toward reimbursement and financial incentive based on clinical outcomes. This has the potential to result in financial gain and dramatic savings for local clinics and large healthcare systems that are following established clinical practice guidelines. Direct costs are significantly lowered when asthma is well-controlled. Preventative care improvements are made when providers properly utilize notational guidelines at the point-of-care.

REFERENCES

- Adams, J. S., & Woods, E. R. (2016). Redesign of chronic illness care in children and adolescents: Evidence for the chronic care model. *Current Opinions in Pediatrics*, 28(4), 428-433. doi: 10.1097/MOP.0000000000000368
- Becker, A. (2012). Pediatric asthma guidelines: what are they good for? A view from the "pro" side. *Pediatric Pulmonology*, 47, 629-631. doi: 10.1002/ppul.21606
- Cicutto, L., Dingae, M. B., & Langmack, E. L. (2014). Improving asthma care in rural primary care practices: A performance improvement project. *Journal of Continuing Education in the Health Professions*, 34(4), 205-214. doi: 10.1002/chp.21254
- Dexheimer, J. W., Borycki, E. M., Chiu, K., Johnson, K. B., & Aronsky, D. (2014). A systematic review of the implementation and impact of asthma protocols. *BMC Medical Informatics and Decision Making*, 14(82). <http://www.biomedcentral.com/1472-6947/14/82>
- Gold, L. S., Smith, M., Allen-Ramey, F., Nathan, R. A., Sullivan, S. D. (2012). Associations of patient outcomes with level of asthma control. *Annals of Allergy & Immunology*, 109, 260-265. doi:10.1016/j.anai.2012.07.024
- Kang, M. K., Kim, B. K., Kim, T. W., Kim, S. H., Kang, H. R., Park, H. W., Chang, Y. S., Kim, S. S., . . . Cho, S. H. (2010).

- Physician's preferences for asthma guidelines implementation. *Allergy, Asthma, & Immunology Research*, 2(4) 247-253. doi: 10.4168/aa.2010.2.4.247
- Lee, J., Gogo, A., Tancredi, D., Garcia, E. F., & Shaikh, U. (2016). Improving asthma care in a pediatric resident clinic. *BMJ Quality Improvement Programme*, 5. doi: 10.1136/bmjquality.u214746.w6381
- Lester, D., Mohammad, A., Leach, E. E., Hernandez, P. I., & Walker, E. A. (2012). An investigation of asthma care best practices in a community health center. *Journal of Health Care for the Poor and Underserved*, 23(30), 255-264. doi: 10.1353/hpu.2012.0140
- Liu, A. H., Gilsenan, A. W., Stanford, R. H., Lincourt, W., Ziemiecki, R., & Ortega, H. (2010). Status of asthma control in pediatric primary care: results from the pediatric asthma control characteristics and prevalence survey study (ACCESS). *The Journal of Pediatrics*, 157(2), 276-281. doi: 10.1016/j.jpeds.2010.02.017
- Loftus, P. A., & Wise, S. K. (2015). Epidemiology and economic burden of asthma. *International Forum of Allergy and Rhinology*, 5(1), 57-60. doi:10.1002/alr.21547
- Mold, J. W., Fox, C., Wisniewski, A., Lipman, P. D., Krauss, M. R., Harris, D. R., Aspy, C., . . . Gonin, R. (2014). Implementing asthma guidelines using practice facilitation and local learning collaborative: A randomized controlled trial. *Annals of Family Medicine*, 12(3), 233-240. doi: 10.1370/afm.1624
- National Heart, Lung, and Blood Institute. (2007). *National asthma education and prevention program expert panel report 3: guidelines for the diagnosis and management of asthma*. Bethesda, MD.
- Okelo, S. O., Butz, A. M., Sharma, R., Diette, G. B., Pitts, S. I., King, T. M., . . . Robinson, K. A. (2013). Interventions to modify health care provider adherence to asthma guidelines: a systematic review. *Pediatrics*, 132(3) 517-534. doi: 10.1542/peds.2013-0779
- O'Laughlen, M. C., Hollen, P., & Ting, S. (2009). An intervention to change clinician behavior: conceptual framework for the multicolored simplified asthma guideline reminder (MSAGR). *Journal of the American Academy of Nurse Practitioners*, 21, 417-422. doi: 10.1111/j.1745-7599.2009.00429.x
- White, S., & Spruce, L. (2015). Perioperative nursing leaders implement clinical practice guidelines using the Iowa model of evidence-based practice. *AORN Journal*, 102(1), 50-59. doi: 10.1016/j.aorn.2015.04.001
- Yawn, B. P., Rank, M. A., Cabana, M. D. Wollan, P. C., & Juhn, Y. J. (2016). Adherence to asthma guidelines in children, tweens, and adults in primary care settings: a practice-based network assessment. *Mayo Clinic Proceedings*, 91(4), 411-421. doi: 10.1016/j.mayocp.2016.01.010
- Zeiger, R. S., Yegin, A., Simons, F. E., Haselkorn, T., Rasouliyan, L., Szeffler, S. J., & Chipps, B. E. (2012). Evaluation of the national heart, lung, and blood institute guidelines impairment domain for classifying asthma control and predicting asthma exacerbations. *Annals of Allergy, Asthma, & Immunology*, 108, 81-87. doi: 10.1016/j.anai.2011.12.001